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# Agriculture.

## COTTON SEED AS STOCK FOOD.

BY J. C. BRÜNNICH.

In the August number of this Journal the Principal of the Queensland Agricultural College dealt with the economic aspect of the utilisation of cotton seed as a food for cattle, and the importance of such utilisation becomes very apparent when we consider that for each pound of cotton fibre or lint produced there are at least 2 lb. of seed.

In the July number appeared a short notice on "Cotton Seed for Sale," and an analysis of cotton seed meal was given, which is the analysis of a very choice decorticated cotton-seed meal, and was followed by the remark that cotton seed after reduction to the form of meal is richer than cotton-seed meal. This statement is not correct and, as a matter of fact, ground cotton seed will have less than half the feeding value.

Ground cotton seed should unquestionably be utilised as cattle food and, if used with discretion, will give good results. Therefore, such use is quite justified until larger quantities of seed are produced, which would make the proper treatment of the seed practicable. The only correct method for the utilisation of cotton seed as food is after decortication and extraction of the oil, on account of the great value of the oil and the well-established fact that cotton-seed meal gives far better results as a cattle food than ground cotton seed.

Henry and Morrison, in their standard work, "Feeds and Feeding," state:—

"The practice of feeding cotton seed to beef cattle in the South is rapidly declining, according to Soule, of the Georgia Station, both because of the demand for the seed for oil production and because cotton-seed meal gives uniformly better results than the whole seed."

In a feeding trial at the Texas Station it was found that 4 lb. of cotton seed substituted for 1.9 lb. of cotton-seed meal produced smaller gain of live weight, and that cotton-seed meal at 26 dollars per ton was cheaper than cotton seed at 12 dollars.

The hard, leathery shells, or hulls, of the cotton seed have practically no feeding value, and are passed by the animals in undigested form. Even when ground very fine the digestibility of the hulls is but little increased, and ground hulls have less

feeding value than straw or corn stover. In many cases the accumulation of a compact mass of undigested hulls in the bowels has caused serious troubles and death. The first observation on so-called cotton-cake poisoning, following the used of undecorticated cotton cake, was made by A. Voelcker, in 1859, and reported in the "Veterinarian." The post-mortem examination of the animal showed the duodenum blocked by 72 lb. of comminuted and densely impacted hulls.

The occasional fatalities caused by such balling or impaction of the hulls do not, however, explain the numerous cases of ill-effects reported from time to time, but show distinctly the necessity of removing a large portion of the hulls from the crushed seed, and the advantages of using decorticated meal. But even decorticated cotton-seed meal cannot always be safely used, and the mere fact that nobody recommends its use for young calves, lambs, swine, and cows heavy in calf, shows that discretion is always necessary when using this highly concentrated food.

Henry and Morrison (*ibid.*) state:—

> "Numerous efforts have been made during the past twenty years to determined the cause of the poisonous effects of cotton-seed meal. The harm has been variously ascribed to the lint, the oil, the high protein content, to a poisonous albumin or alkaloid, to choline and betaine, to resin present in the meal, to decomposition products, and to salts of pyrophosphoric acid. Further work shows that the poisonous effects are not due to any of these causes."

It may be safely assumed, however, that the proteins in the cotton-seed meal, present in such large amounts, when fed to young animals, or animals already suffering from slight digestive troubles, or when being mixed with other unsuitable fodder, are not readily and properly peptonized by the digestive fluids, but micro-organisms gain the upper hand and form poisonous ptomains. It is well known that choline and betaine, in itself very slightly poisonous, are always found in cotton-seed meal, and that the former changes readily into the much more poisonous neurine.

A very complete summary of the many theories advanced up to the present time by many investigators on the probable causes of injuries due to cotton-seed meal is given by Icie J. Macy in "Historical Notes on Cotton Seed as Food" ("Journal of Dairy Science," May, 1921):—

> "In 1915 two theories arose:—Firstly, that cotton-seed meal poisoning is a deficiency disease, as set forth by Rommel and Vedder (1915) and later supported by Wells and Ewing (1916); secondly, that it is due to a definite phenolic compound (gossypol) found in cotton-seed meal as shown by Withers and Carruth (1915).
>
> "The results of investigators in their studies of cotton-seed foods are not constant, owing in part to the notable variations in effects upon live stock. Even animals of the same species respond at different times with unlike symptoms, although they consume similar quantities of the same food. Other difficulties are encountered. The degree of toxicity of cotton seed depends on the variety of seed and upon the climate and soil in which they are grown. And again, the meal made from the kernels is greatly altered by the treatment in the process of manufacture. There is uncertainty as to the degree of the responsibility of gossypol for the toxicity, as results of investigators differ. All such factors lend difficulty to the study of the effects of cotton-seed foods and render the present status of the problem uncertain."

All these remarks point to the fact that one must be cautious when feeding stock with cotton seed or its products. Fresh, well-cleaned decorticated meal is unquestionably an excellent, highly nutritious food for cattle, but should not be given in quantities exceeding 4 lb. per head of 1,000 lb. live weight. Young calves, lambs, pigs, and cows within four weeks of calving should not get any cotton-seed meal.

In order to ascertain the actual food value of our Queensland-grown cotton seed, samples were obtained from our departmental store, and short lint, hulls, and kernels were carefully separated and analysed.

The actual amounts obtained agree very closely with the yields obtained elsewhere.

According to Burkett and Poe, 1 ton of cotton seed yields—

| | | |
|---|---|---|
| Linters or short fibre .. | 27 lb. or 1.4 per cent. | 43. 4 per cent. |
| Hulls .. .. .. | 841 lb. or 42.0 per cent | |
| Cake or meal .. .. | 732 lb. or 36.6 per cent. | |
| Crude oil .. .. .. | 280 lb. or 14.0 per cent. | |
| Loss, &c. .. .. .. | 120 lb. or 6.0 per cent. | |
| | 2,000 lb. or 100.0 per cent. | |

We actually obtained from our own seed 10.5 per cent. of short lint, 31.3 per cent. of hull, or 41.8 per cent. lint and hull, and 58.2 per cent. kernel.

At the same time a larger quantity of seed was treated by one of our local firms, and, after crushing the seed, as much as possible of the hulls was sifted out. From 2 tons of seed about 1 ton of meal was obtained, but as the cost of treatment, crushing, and sieving amounts to £2 per ton, the cost of this meal would be £9 per ton if the seed is £3 10s. a ton.

The analysis of this meal is given below, and I believe that in this form the bulk of our cotton seed should be utilised at present as cattle food, until larger quantities of seeds produced would warrant the establishment of an oil-extracting plant, as by the extraction of the oil the protein percentage of the meal is considerably increased.

ANALYSIS OF :

| —— | Lint. | Shell. | Kernel. | Whole Seed. | Sifted Whole Seed Meal. |
|---|---|---|---|---|---|
| | Per cent. | Per cent. | Per cent. | Per cent. | Per cent. |
| Moisture .. .. .. | 7·83 | 12·10 | 7·15 | 8·8 | 7·59 |
| Crude protein .. .. | 2·50 | 3·06 | 36·44 | 22·4 | 34·00 |
| Crude fat .. .. .. | 0·61 | 0·37 | 29·11 | 17 1 | 28·22 |
| Nitr. free extract .. .. | 14·65 | 60·03 | 18·27 | 31·0 | 14·95 |
| Crude fibre .. .. .. | 72·50 | 21·11 | 4·03 | 16·6 | 9·24 |
| Crude ash .. .. .. | 1·91 | 3·33 | 5·00 | 4·1 | 6·00 |

In order to ascertain the actual unit value of the food and to compare it with other commercial concentrated foods, in the same manner as it was done for calf foods (''Queensland Agricultural Journal,'' March, 1919), the total number of food units is ascertained by multiplying percentages of digestible proteins and fat by 2½, and adding the percentage of other digestible carbohydrates, or nitrogen-free extract, and digestible fibre. These units divided into the price per ton gives the price per unit:—

COST OF FOODS.

| —— | DIGESTIBLE NUTRIENTS. | | | | Food Units. | Cost per ton. | Cost per Unit. |
|---|---|---|---|---|---|---|---|
| | Protein. | Fat. | Carbohydrates or Nitr. free Ext. | Fibre. | | | |
| | % | % | % | % | % | £ s. d. | s. d. |
| Cotton seed .. .. | 15·2 | 14·9 | 15·5 | 12·6 | 103·4 | 3 10 0 | 0 9 |
| Sifted Cotton seed meal .. | 23·1 | 24·5 | 7·5 | 7·0 | 133·6 | 9 0 0 | 1 4 |
| Prime decortated Cotton-seed meal | 37·0 | 8·6 | 21·8 | | 135·8 | .. | .. |
| Linseed meal .. .. | 19·9 | 10·4 | 27·6 | 5·5 | 108·8 | 16 0 0 | 2 11 |
| Sunlight Oilcake .. | 12·9 | 8·4 | 36·3 | 7·3 | 96·7 | 15 0 0 | 3 1 |
| Maizemeal .. .. .. | 7·4 | 3·0 | 62·8 | 3·0 | 91·8 | 15 0 0 | 3 3 |
| Bran .. .. .. | 11·4 | 3·8 | 41·6 | 2·2 | 81·8 | 8 10 0 | 2 0 |
| Pollard .. .. .. | 12·4 | 4·2 | 46·0 | 2·0 | 89·5 | 8 10 0 | 1 11 |

The table clearly shows that cotton seed is the cheapest concentrated food obtainable at present, more particularly in comparison with linseed meal and oilcake which, only two years ago, were some of our cheapest concentrated foods, but have since enormously increased in cost. Pollard is still a reasonably cheap concentrate. Some of the prices are hard to explain. Why should maizemeal be £15 per ton, when maize costs only about £9?

Although feed is plentiful just now, farmers are strongly advised to secure their share of the cotton seed to supplement the ration of their dairy stock with reasonable amounts of this highly nutritious food. The increased yield and better quality of the milk will return a good profit for the extra outlay, and show the value of systematic feeding of all stock.

## WINTER FEEDS ON THE ATHERTON TABLELAND.

Mr. N. A. R. Pollock, Northern Instructor in Agriculture, has received the following report (dated 10th September, 1921) from Field Assistant F. J. S. Wise on winter green feed trials at Mr. Robert Campbell's farm, Peeramon:—

"Though the wet season had provided sufficient natural feed for most dairymen's requirements, the full benefit of a winter crop, even sown early, would, by subdivision of paddocks, be felt in any year. The profits would be immediate, showing in the increased cream returns, and the cattle would be kept in a state of health and vigour, conducive to heavy production. An area of a few acres of well-planned crops would be sufficient to tide most tableland dairymen over the lean months.

"The whole of this crop could have been converted into valuable hay if harvested late in July, as fine weather prevailed for the purpose, but it is feared, now that drizzly weather has started, that portion of the crop may be spoiled. As a hay proposition, the southern portion of the tableland is uncertain, but the crops included in the trial, on the farm of Mr. Campbell, as green fodder leave little to be desired. As our last year's trials at Tarzali were the means of many small areas being planted, it is to be hoped that the activities of the Department will be again marked by the increase of many winter fodder areas in the dairying districts.

"As the later trials have only recently been planted, some months must elapse before other results become available.

"NEW SCRUB LAND UNDER GRASS FOR SEVERAL YEARS.

"*Ploughed early in April. Sown 22nd April*, 1921. *Yields taken 3rd August*, 1921. *Area*, 3 *acres.*

"*Plot* 1—*Blue Field Peas.*—This old standard pea was very encouraging in growth throughout, and produced a solid mass of fodder. Yield green stuff (pods well set), 8 tons per acre.

"*Plot* 2—*Grey Field Peas.*—As was the case with this variety in trial last year, the growth was excellent; in fact, it is doubtful whether field peas ever grew better. Personally, I have not seen anything to come near them. The very heavy growth of succulent fodder would be sufficient inducement for all farmers in the dairying districts to supplement their supplies with this excellent legume. Though broadcasted at the rate of 25 lb. per acre, the vines completely covered the ground, and specimens have been secured over 8 ft. in length. The yield was equal to 15 tons per acre in a medium portion of the crop, and much heavier in places.

"*Plot* 3—*Golden Vetches.*—After the experiment with this crop last season it will be remembered that I was strong in the praise of it (refer to report dated 14th September, 1920). This season, when sown alone at the rate of 30 lb. per acre, the crop made one dense mass on the ground, and though yielding well, owing to its creeping habit, requires a strong cereal to support it. A crop worthy of more attention than is at present given. Yield, 8 tons per acre.

"*Plot* 4—*Golden Vetches combined with Bunge Wheat.*—This combination is undoubtedly an excellent one. The wheat was sown at the rate of ½ bushel to the acre, but it would be an advantage to increase this quantity. The vetches doubtless increase the value of the basic crop, and even if fed off would do much to assist the dairymen in keeping up supplies and improving their soil. The yield was high, and samples of the vetches grew 4 ft. up the cereal. Yield, 14½ tons.

"*Plot* 5—*Bunge Wheat.*—Excellent growth was maintained throughout by this variety and, in spite of the heavy wet, showed little sign of rust. As a green fodder it deserves a lot of attention in this district. Yield, 8 tons per acre. Flag very heavy.

"*Plot* 6—*Amby Wheat.*—Though not yielding the quantity in bulk of green stuff when compared with Bunge, this variety has many admirable features and may, possibly in the wetter areas, be a surer crop. Yield, 6½ tons.

"*Plot* 7—*Warren Wheat.*—As was anticipated, this variety would prove a top-notcher as a wheat for green fodder in our dairying centres. At about two and a-half months a wonderful bulk of green feed was in evidence, and up to earing stage the flag was almost unaffected by rust. It would be a risky crop for hay, as the heavy growth of the plant would not be sustained as moisture began to peter out. It should do well grazed off at about two months and then allowed to grow for a final yield of green fodder. Yield, 9½ tons.

"*Plot* 8—*Florence Wheat.*—This good old variety would be a more certain crop on the tableland than perhaps any other wheat, but in a wet season, as the one in which this test has been conducted, the value of the later wheats and their heavy growth is very marked. In a dry season, however, the tables would be turned, and where Florence would be a 'certain something,' a variety such as Warren may be a dead loss. Owing to its being very mature, this variety weighed light at time of tests for green fodder weight, yielding 5½ tons.

"The time of harvest was very opportune for wheat varieties Bunge and Warren to weigh well, the latter especially was at its heaviest stage, just breaking into ear, whereas Florence was almost ripening off. The combination of wheat and vetches has again proved to be one of the most valuable farmers could produce on the tableland, as a great mass of succulent fodder resulted. The wheats were sown at the rate of 1 bushel per acre, and in most tableland soils, especially with a sparse stooler as Florence, could be increased 50 per cent. with advantage. The rain during the growing period was 18 in., which is heavier than usual, but an average of the last six years for the period this crop occupied the land is 10.25 in., so that this year's results could be proportionately obtained in almost any year.

"The big argument for the success of these trials at Peeramon rests on the fact that a heavy crop of maize was cut for silage in March, the land being afterwards immediately ploughed for the reception of the seed for the second crop."

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## SOME NOTES ON THE SOILS AND FOREST FLORA OF THE DIVIDING RANGE—NORTH OF ROMA.

By H. I. JENSEN, D.Sc. (Syd.).

### I.

### INTRODUCTION.

It has been known for ages that many forest trees have a special predilection for certain kinds of soil, and as the science of geology has developed it has been noticed by field geologists in all parts of the world that certain trees are almost entirely confined to certain geological formations. So definite is the dependence of some plant species on a particular rock type that these plants can be used in field mapping as safe indications as to the formation beneath the soil on which they grow.

The study of forests in relation to soils and geological formations has attained high scientific development in countries like France and Denmark, where reafforestation is a matter of great national importance. The relation between forest trees and geological formations here in Australia has been repeatedly referred to and discussed in scientific writings and reports by J. H. Maiden, F.R.S. (Government Botanist of N.S.W.), and R. H. Cambage (now Under Secretary for Mines, N.S.W.), E. C. Andrews, B.A. (Chief Geologist, N.S.W.), and the writer as well as many others.

The writer is not a botanist, but he has endeavoured to get a working knowledge of the timbers of every area he has investigated as geologist or soil surveyor in the Northern Territory, Queensland, and New South Wales, by collecting botanical specimens and having them diagnosed by men like Mr. J. H. Maiden or Mr. C. T. White, who are specialists in the science of botany.

The writer has outlined the relationship of soils to the underlying geological formations and also the principles which govern the dependence of forest flora on geological formation, in a series of articles in the "N.S.W. Agricultural Gazette," during the years 1908-1912, when he was carrying out soil survey work in New South Wales. These investigations were published in text-book form by the Agricultural Department of New South Wales in "Soils of New South Wales" (Government Printer, Sydney. Price, 5s.).

A brief summary of the conclusions arrived at by extensive surveys, accompanied by thousands of soil analyses, in New South Wales, is desirable at the outset of this series of articles.

It was found that the character and quality of soils were dependent principally on geological formation, secondarily upon climate and topography. Topography is, however, as a rule itself dependent on geological formation and climate, and is therefore a factor of minor importance as compared with geology and climate.

Thus in coastal regions and inland regions alike, soils can be divided into geological groups which stand in the same relation to one another, as for instance—

| | |
|---|---|
| Granite<br>Sandstone<br>Quartz schist | Sandy light loams relatively poor in mineral plant-food. |
| Trachyte<br>Andesite<br>Shale | Loams, fair in plant-food. |
| Diorite<br>Basalt<br>Calcareous sandstone<br>Calcareous shale<br>Limestone | Clayey soils rich in plant-food. |

But, although coastal basalt or limestone soil type is very high in plant-food as compared with a coastal sandstone or granite soil type, a typical inland sandstone soil may carry more soluble plant-food than the coastal typical basalt soil, without the relative order of richness in plant-food for the various groups being interfered with. This is due to the leaching which coastal soils (wetter climate soils) undergo as compared with inland soils.

Just as chemical plant-food in a soil depends on geological formation so does soil texture, and climate affects soil texture as well. However, a clayey basalt soil in a wet climate is very good agricultural country, while in a dry climate it is not infrequently unsuited for cultivation on account of its stiffness and alkalinity. It is therefore apparent that soil analysis is not by any means a reliable guide to the agricultural value of a soil. Many a soil which gives an analysis very poor in mineral plant-food contents is a soil of high fertility, owing to the underlying geological formation by its gradual disintegration supplying the plant-food ingredients as speedily as the plants can use them. The poverty of the soil under analysis is, in such cases, due to its being a leached soil. For instance, the granite soils on the hill slopes around Stanthorpe seem, on analysis, to be very poor in plant-food. They are deficient in lime, potash, and phosphate, at least in an available form. Yet that country has in many places supported orchards for over thirty years without any manure being given, and it is safe to say that in some cases more potash—many times more potash—has been removed from the ground in fruit, seeds of fruit, and prunings than the soil showed to be present when analysed. Where did this surplus potash come from? It came out of the decomposing minerals of the underlying granite. As fast as these soluble plant-foods get out of the granite minerals into the soil water they are either made use of by plants or leached away. We can also fix them in the soil by increasing the quantity of humus in the soil, for humic acids combine with the mineral substances, forming less soluble compounds.

Hence, where we have a geological formation which, like dioritic granite, liberates much potash, lime, and phosphate, in its decomposition overlain by a leached hungry soil, we can improve that soil in potash, lime, and phosphate without adding any of these substances but simply by increasing the amount of humus in the soil with catch crops, &c. But when the formation below the sandy leached soil is silicious granite or sandstone, very little mineral plant-food gets liberated through rock disintegration, and these substances must be added in the form of artificial manure.

When this is fully comprehended, it is easily seen how deceiving soil analyses are when the geological formation and conditions of occurrence of the soil are not known to the analyst.

It therefore follows that a geological examination of an area is a better guide to the farmer than soil analyses unaccompanied by field inspection, so long as the geologist understands the principles of soil chemistry.

When the writer commenced his researches on soils he was hopefully working under the delusion that soil analysis by itself could be made the basis of soil classification. Little by little the hope was shattered, although various methods of analysis, such as the hydrochloric, the citric, and the water soluble methods were tried.

The researches, however, did establish the fact that the bushman's method of judging soil by the timber growing on it was thoroughly sound in principle.

It therefore follows that notes made on soils and the timbers growing on them may be very useful to intending agriculturists, and are consequently offered for what they are worth. It may be stated that the determination of the plants has been made by Mr. C. T. White, Government Botanist of Queensland, to whom the writer owes his sincerest thanks.

It will be best to consider the subject under discussion geographically under the headings—

1. Roma to Injune.
2. The Maranoa Valley.
3. The head of the Warrego.
4. The tributaries of the Nogoa.
5. The tributaries of the Brown.
6. Westgrove and Glenhaughton, Taroom.
7. The Drummond Range.
8. Tables of vegetation.

## ROMA TO INJUNE.

The soils are predominantly good in chemical plant-food constituents and somewhat variable in texture. However, there are belts of rather poor sandy soil at intervals, corresponding to outcrops of white sandstone, but these do not constitute any large area.

The country traversed can be divided into—

(*a*) Open plains.
(*b*) Brigalow scrub and brigalow-belar scrub.
(*c*) Belar-wilga scrub.
(*d*) Sandalwood country.
(*e*) Box country.
(*f*) Ironbark country.
(*g*) Pine country.
(*h*) Moreton Bay ash and sugar-gum country.
(*i*) Basaltic box lands.
(*j*) Gilgai country.

*Open Plains.*—Treeless plains invariably occur on heavy black soil of a highly calcareous nature. It is sometimes of basaltic nature, as on the Darling Downs, but more often of limestone or calcareous shale derivation in the area under review. Such black soils usually expand enormously on wetting, and this feature is by many considered responsible for the absence of trees on them. It is argued that formation of huge cracks in dry weather, the hummocking up of the soil by expansion in wet weather, interfere so much with the roots of trees that tree growth cannot take place.

However, a more likely cause of the open plain is the presence in the soil of alkali or other soluble salts detrimental to the germination of seeds of forest trees. It is known that brigalow frequently supersedes open plain, and that where a brigalow thicket dies out we sometimes get a plain. Brigalow can stand more alkali than other plants, and therefore casts some light on the problem.

An efflorescence of "white alkali" (sulphate of soda) is often met with in pockets on these plains, and over some areas gypsum (sulphate of lime) is exceedingly plentiful in the soil. The white alkali is more often seen on the basalt plains and the gypsum on the rolling downs or cretaceous marine limestone. White alkali and gypsum are very different substances, but either can be present in such excess as to hinder germination. This accounts for the fact that a very heavy rain, which thoroughly leaches all the soluble salts out of the ground, is necessary to germinate the grass seeds on the black soil plain.

The stiffness of black soil plain is due mainly to "black alkali" (carbonate of soda) which is not only detrimental to the texture of the soil but is also a plant poison. This may be present to the extent of .05 per cent., and the problem of cultivating black soil plain hinges on the difficulty of destroying this salt cheaply and effectively. Mr. Symmonds's scheme of applying nitric acid would be very good if nitric acid were cheap enough. In chemical plant-foods the black soils are very rich, as may be gauged from the following anaylses by the hydrochloric acid method:—

| | Moisture. | Volatile. | Nitrogen. | Lime. | Potash. | Phosphoric Acid. |
|---|---|---|---|---|---|---|
| | % | % | % | % | % | % |
| Namoi, N.S.W., black soil (average) .. | 5·45 | 6·36 | ·099 | ·680 | ·390 | ·201 |
| Castlereagh River, N.S.W. (average) .. | 4·82 | 7·95 | ·110 | ·476 | ·264 | ·154 |
| Moree, N.S.W. (average) .. .. .. | 7·04 | 5·83 | ·066 | ·714 | ·286 | ·092 |

These soils are, roughly, seven times as rich in mineral plant-food as fairly good sandstone soils.

When a hill occurs in black-soil plain country, we find the black soil passing into chocolate loam on the slope, and here we get a sprinkling of forest trees. The soil of such hills is not nearly so rich in plant-food, being more leached, but, owing to the carbonate of soda being leached out first, it is more fertile.

The trees on the fringe of blacksoil plains are brigalow (*Acacia harpophylla*), emu apple (*Owenia acidula*), box (*Eucalyptus populifolia*), sandalwood (*Eremophila Mitchelli*).

Open plains are characteristic of the calcareous shales and limestones of the cretaceous (rolling downs), but occur also in patches in the brigalow belt of the Lower Walloon calcareous shales at Injune Creek and Mount Hutton.

*Brigalow Scrubs.*—These occur on the same or a very similar soil type as the open plains, namely—heavy, black, clay soils rich in plant-food but also rich in the detrimental alkali. When cleared they form as excellent grasslands as the blacksoil plains, but they contain the same defects from the agricultural point of view. If heavy rain follows a bush fire on the brigalow outskirts of blacksoil plains, the brigalow tends to spread over the plain, but when fires are not followed by rain the plain spreads at the expense of the brigalow, except where the prickly-pear saves the brigalow, as is the general rule to-day. Like other wattles, the brigalow needs a bush fire to crack the seeds in order that they may germinate. Brigalow and box also change places at intervals. If a brigalow belt which is not heavily charged with alkali gets destroyed under unfavourable conditions for the germination of the seed, box (*Eucalyptus populifolia*) may replace the brigalow. On the other hand, if a bax flat has its drainage interfered with so as to accumulate alkali on the flat, the box will get replaced by brigalow.

*Brigalow and Prickly-pear.*—It is a most noticeable fact that the prickly-pear everywhere enters into close partnership with brigalow. Eventually by checking bush fires it will kill out the brigalow. The brigalow soils are ideal for prickly-pear, and the shade of the brigalow offers shelter to the pear from the direct rays of the sun. It is hardly to be doubted that the prickly-pear is a lover of saline land, especially rich saline land. This fact came under the writer's notice through a walk along the beach from Sandgate to Cribb Island. We find prickly-pear in various places along the foreshores of Deception Bay, where seaspray is carried over the land, and back from the sea over areas which have been only recently salt marshes or arms of the sea. The pear does not spread back over the leached soils of the higher lands, because these soils contain no salts. With a view of testing this explanation, the writer collected three type soils—

No. 460.—Typical brigalow soil with dense pear spreading fast, 40 miles north of Roma-Durham Downs road.

No. 461.—Typical belah soil, with some pear, healthy but not spreading as fast as in the brigalow. Same road, 30 miles north of Roma.

No. 462.—Typical box soil. Some pear, but not healthy. 35 miles north-west of Roma, on Cornwall Station.

[TO BE CONTINUED.]

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## THE DISSEMINATION OF INTRODUCED PASTURE GRASSES IN CENTRAL QUEENSLAND.

By G. B. BROOKS, Instructor in Agriculture.

That the continued prosperity of this State is to a large extent dependent upon our pastures is only too evident when we look at the trainloads of fat stock in transit to the various meatworks and large centres of population, the huge consignments of wool *en route* to ports for shipment overseas, and the returns from our butter and cheese factories.

In view of the fact that our grasses are such a valuable asset, it is somewhat surprising that so little attention has been given, more particularly by pastoralists, to their habits and characteristics. Even the testing of high quality indigenous varieties in areas where the more inferior sorts predominate would be a work of immense value and importance.

While dairy and other farmers are equally indifferent as to the merits of our native grasses, they must be credited with giving introduced varieties a fair amount of attention. It will be found that all those of any importance suitable to sub-tropical conditions will be met with in practically every locality in the coastal areas of Central Queensland. In all probability it would be a difficult matter to find a farm that has been under occupation for a few years upon which there are not two or three introduced varieties growing. Even in the cities they are well represented. In Rockhampton a collection can be secured on practically every allotment. The following is a list of those growing in my own backyard, all as far as I know having found their way there by natural agencies:—*Paspalum dilatatum*, Rhodes grass (*Chloris gayana*), *Chloris virgata*, *Chloris barbata*, Guinea grass (*Panicum maximum*), giant couch grass (*Panicum muticum*) red Natal grass (*Tricholæna rosea*), prairie grass (*Bromus uniloides*), and buffalo grass (*Stenotaphrum americanum*).

The actual area of pastures in Central Queensland sown down with introduced grasses is somewhat difficult to estimate, but in all probability it would be in the vicinity of 40,000 acres.

The notes hereunder will give some idea as to the distribution of the respective varieties.

### RHODES GRASS (*CHLORIS GAYANA*).

Of the area under introduced grasses in Central Queensland, this variety would undoubtedly claim 95 per cent. When paspalum was boomed some twenty years ago, it found its way on to practically every farm, being invariably sown among the indigenous growths. The extensive areas of scrub country existing at Mount Larcom, Barmoya, Dawson Valley, and other places had not then been opened up. In the course of recent years thousands of acres of scrub have disappeared, and in its place are waving fields of succulent Rhodes grass. To the scrub settler this grass has several points in its favour. For example, the cost of seeding an acre is little more than the labour of sowing the seed. No covering is required, germination is invariably good, and subsequent growth rapid; in fact, it is generally too rapid, the average settler finding a difficulty in keeping it from growing rank and running to seed. To say that 50 per cent. of the material is wasted during the first three years after being seeded down would be a very conservative statement. A commencement has, however, been made to harvest this grass for hay, more particularly in the Mount Larcom and Barmoya districts.

Rhodes grass is undoubtedly a great drought-resister. Instances have been noted where it has practically disappeared during prolonged droughts, but this was evidently due to overstocking, adjacent paddocks not so heavily grazed not being affected.

### *PASPALUM DILATATUM.*

Although occasional paddocks are met with, most of the paspalum grown is to be found in low-lying situations as a mixture among the native sorts. It is really only suitable for coastal localities enjoying a heavy and well-distributed rainfall. Given those conditions, it is undoubtedly of great value to the dairy farmer, but for fattening purposes it does not find much favour.

### GIANT COUCH OR PARA GRASS (*PANICUM MUTICUM*).

This grass is well distributed throughout the Central District, but individual areas are by no means extensive. That it is not more largely grown is not through any lack of recognition of its value, but more as a result of the difficulty and expense entailed in establishing it on a large scale. It is not only a very shy seeder, but the seeds shatter as soon as they mature; therefore, propagation has to be carried out by means of cuttings or roots. One of the quickest methods of establishing it is to run the long shoots through a chaffcutter, using only one knife, and the long cut. The resultant cuttings are then distributed in a furrow and covered lightly. Being susceptible to frost, this grass is only suitable for coastal areas. It is one of the best varieties for growing along the banks of creeks, binding embankments, &c. It will also withstand submerging for some time, and salt water does not seem to harm it, as it is to be found growing on the banks of the Fitzroy, where the tidal waters cover it occasionally. As a result of its luxuriant habit of growth, it will smother out nut grass and other noxious weeds, including even prickly-pear. Although coarse, it makes a very good chaff for home consumption, a peculiar characteristic being that it will retain its succulence to such an extent when stacked away as a cured hay that when cut into chaff it will ferment in the bag.

### *CHLORIS VIRGATA* (No Common Name).

Isolated patches of Virgata are to be met with in most of the Rhodes grass areas, but, being less aggressive than the Gayana, it is not likely to become at all prominent. It has a more upright habit of growth, and does not send out surface running shoots so freely as the common Rhodes. It can be distinguished by its lighter inflorescence, while the seed head does not open up and assume the characteristic star shape of most varieties of the Chloris family. No effort has been made to establish it as a separate variety on a large scale.

A variety of Chloris, known as the "Australian Rhodes Grass" (*C. barbata*) although not credited with being an introduction, was rarely met with in the coastal areas until a few years ago. In the Journal of February, 1912, the writer made reference to this grass as having made it appearance in the Charters Towers district. As a result of the remarks made, seed was obtained from that centre and grown in many localities where it had not hitherto made its appearance. In the recently cleared scrub lands, more particularly at Mount Larcom and the Dawson Valley, fairly considerable areas of *barbata* are in existence. It is also becoming a prominent feature along the various railway lines, notably at Ambrose, North Coast Line. It makes its appearance early in the spring, but, being more of a surface-rooter, it is less drought-resistant than ordinary Rhodes grass. A heavy seeder, it will establish itself very quickly on any bare patches of land adjacent to where it is growing. It has a high nutritive value and is relished by stock.

### GUINEA GRASS (*PANICUM MAXIMUM*).

Isolated patches of this grass are to be met with on most of the farms along the coast. Although it seeds very freely and germinates readily, it is not likely to become

a useful pasture grass, for the simple reason that it will not stand grazing. At many places on the railway line between Cairns and the range this grass had at one time practically taken possession. Although 6 to 8 ft. high inside the fences, outside in the adjacent paddocks not a plant was to be seen. It provides a large amount of green succulent material, but it has to be cut before it reaches the seeding stage, otherwise it gets very hard and wiry.

### PRAIRIE GRASS (*BROMUS UNILOIDES*).

Repeated attempts have been made by dairy farmers to grow this useful winter grass, but results have not been of a very promising nature. Prairie requires a fair amount of moisture, and as the winters in the Central district are invariably dry, the future for this variety is not very encouraging.

### CANARY GRASS (*PHALARIS BULBOSA*).

This winter variety has been tried in various parts of the Central district, but, so far, little enthusiasm has been shown over its introduction. This is mainly on account of two important requirements, namely—winter moisture and the attention practically of a cultivated crop.

### RED NATAL GRASS (*TRICHOLŒNA ROSEA*).

According to records, this grass was introduced into Queensland as an ornamental variety as far back as 1876. Tests in regard to its value as pasture were carried out at Mackay and other northern districts twenty-five years ago. They were not too favourable, for while producing a large amount of fodder it was found to be more or less of an annual. Since that time its distribution has largely been by natural agencies, its first appearance in a district being invariably along the railway line. Although a strong grower, it is by no means aggressive, and will rarely establish itself among other sorts. On bare ground, or on vacant cultivated land, the wind-carried seeds germinate readily, and given favourable climatic conditions, subsequent growth will be exceedingly rapid. This invasion is often a distinct advantage as, for instance, in scrub areas where a poor germination has been secured of Rhodes grass, red Natal will take possession of the bare patches, which otherwise would become overrun with weeds and undergrowth. Its wind-carried seeds makes it more or less of a pest if growing adjacent to cultivated areas. Frost cuts it down, but, owing to mild climatic conditions, it has continued to bloom right throughout the present winter. In some of the cleared scrub areas, red Natal has become quite a feature of the landscape. Although the area under paspalum is difficult to estimate, even approximately, yet in all probability red Natal would more than equal it, and thus take second place to Rhodes.

### BUFFALO GRASS (*STENOTAPHRUM AMERICANUM*).

Small areas of buffalo are to be met with throughout the Central district, but on account of its coarse nature there has not been any attempt to establish it as a pasture. Stock are invariably to be found grazing on it early in the morning while wet with dew. I have been informed by bullock-drivers engaged in the timber industry in the Cooroy district that their teams do well on this grass, preferring it to the more succulent paspalum.

### KIKUYU (*PENNISETUM LONGISTYLUM*).

This variety has not so far been grown to any extent, having only been introduced to Australia in 1919. It promises, by its habit of growth, to be a valuable addition to the list of introduced sorts. It has not yet exhibited any signs of seeding, and, as propagation will have to be carried out by cuttings, its distribution on an extensive scale is not likely to be rapid.

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## RESULTS OF THE JUVENILE CORN-GROWING COMPETITION, 1920-21.

Owing to various causes, principally the dry period experienced in February, only seventy-two out of the original 156 entrants complied with the conditions of the competition.

The quality of the cobs forwarded from most districts may, on the whole, be regarded as highly satisfactory; some, however, showed lack of type character and uniformity. Shelling percentages were generally very satisfactory, reaching as high as 87.93, whilst only two competitors sent cobs giving less than 80 per cent.

Owing to the increased number of competitors and a somewhat irregular season, the average yield for the whole competition was slightly under that of the previous year, and works out at 52.24 bushels per acre. The highest yield was obtained in the Alberton (South Coast) district, where 122.2 bushels per acre were obtained.

The following are the tabled results of actual yields of plots for 1920-21:—

| No. of plots. | Return per acre. |
|---|---|
| 3 .. .. .. .. | Below 20 bushels |
| 22 .. .. .. .. | Ranging from 20 to 40 „ |
| 21 .. .. .. .. | „ 40 to 60 „ |
| 17 .. .. .. .. | „ 60 to 80 „ |
| 5 .. .. .. .. | „ 80 to 100 „ |
| 4 .. .. .. .. | „ 100 to 122.2 „ |

The awards made in connection with the competition are shown in tabulated form.

## PRIZE WINNERS.

### RESULTS OF JUVENILE CORN-GROWING COMPETITION, 1920-21.

| Name of Competitor. | Age. | Yield per Acre in Bushels. | Points Awarded for Maximum Yield—Maximum Points, 75. | Quality of Grain and Uniformity of Ear—Maximum Points, 15. | Records and Field Data—Maximum Points, 10. | Total Points—Maximum 100. | Remarks. |
|---|---|---|---|---|---|---|---|
| **SPECIAL PRIZES.** | | | | | | | |
| Miss E. Marks, Alberton | 15 5/6 | 122·2 | 75 | 6·8 | 5 | 86·8 | No. 1 Dist. 1st, £10. |
| T. A. Smoothy, Pinelands | 17 | 113·3 | 69·6 | 10·1 | 6 | 85·7 | No. 3 Dist. 2nd, £5. |
| H. M. McGinn, Oakey Ck., *via* Eumundi | 14 1/2 | 113·5 | 69·7 | 8·2 | 4 | 81·9 | No. 2 Dist. 3rd, £3 |
| **No. 1 DISTRICT.** | | | | | | | |
| Miss E. Marks, Alberton | 15 5/6 | 122·2 | 75 | 6·8 | 5 | 86·8 | 1st, £5 |
| W. Schmidt, Alberton .. | 13 | 73·9 | 45·4 | 9·3 | 4 | 58·7 | 2nd, £2. |
| A. Schmidt, Alberton .. | 14 | 69·4 | 42·6 | 8·6 | 4 | 55·2 | 3rd, £1. |
| R. Jonasson, Alberton .. | 12 1/2 | 66·5 | 40·8 | 9·9 | 4 | 54·7 | |
| L. C. Jonasson, Alberton | 15 1/12 | 67·19 | 41·3 | 7·8 | 5 | 54·1 | |
| H. Beitz, Alberton .. | 13 1/12 | 64·1 | 39·4 | 8·9 | 3 | 51·3 | |
| M. M. Noe, Rathdowney.. | 16 1/12 | 40·4 | 24·8 | 8·1 | 3 | 35·9 | |
| F. W. Noe, Rathdowney.. | 18 | 41·59 | 25·5 | 7·2 | 3 | 35·7 | |
| H. J. Dunn, Cryna .. | 11 | 34·18 | 21·0 | 9·7 | 3 | 33·7 | |
| W. E. Patterson, Glamorgan Vale | 18 | 31·6 | 19·4 | 6·97 | 3 | 29·37 | |
| E. Voigt, Lark Hill, Walloon | 13 1/12 | 28·9 | 17·7 | 7·27 | 4 | 28·97 | |
| R. Behm, Mt. Forbes .. | 16 1/4 | 22·6 | 13·8 | 10 | 5 | 28·8 | |
| W. O. Griffiths, Mt. Forbes | 18 | 21·04 | 12·9 | 9·1 | 5 | 27 | |
| H. Gray, Cryna .. .. | 12 | 23·99 | 14·7 | 8·9 | 2 | 25·6 | |
| J. J. Patterson, Glamorgan Vale | 13 | 23·3 | 14·3 | 6·2 | 3 | 23·5 | |
| E. Wilkinson, Boyland .. | 15 | 18·6 | 11·4 | 5·4 | 3 | 19·8 | |
| **No. 2 DISTRICT.** | | | | | | | |
| M. H. McGinn, Oakey Ck., *via* Eumundi | 14 1/2 | 113·5 | 69·7 | 8·2 | 4 | 81·9 | 1st Prize, £5 |
| C. G. Adcock, Eel Creek, Gympie | 17 7/12 | 94·5 | 58 | 9·1 | 9 | 76·1 | 2nd, £2. |
| A. G. McGinn, Oakey Creek, *via* Eumundi | 16 1/2 | 104·6 | 64·3 | 7·27 | 4 | 75·57 | 3rd, £1 |
| N. J. Gordon, Cedar Creek | 16 | 84·9 | 52·2 | 8·1 | 1 | 61·3 | |
| S. Mountford, Woodford | 8 | 70 | 43·0 | 9·0 | 3 | 55·0 | |
| D. Mountford, Woodford | 10 | 67·3 | 41·3 | 8·5 | 3 | 52·8 | |
| V. T. Greensill, Mungar .. | 12 3/4 | 62·04 | 38·1 | 7·9 | 2 | 48·0 | |
| F. Carseldine, Woodford | 11 1/2 | 55·9 | 34·3 | 9·5 | 3 | 46·8 | |
| H. J. Carseldine, Woodford | 16 1/2 | 53·9 | 33·1 | 9·6 | 3 | 45·7 | |
| A. T. Hill, Fairneyview .. | 10 | 49·3 | 30·3 | 7·4 | 3 | 40·7 | |
| W. F. Nugent, Coal Creek | 16 1/2 | 42·5 | 26·1 | 7·5 | 3 | 36·6 | |
| M. Pacey, Wanora .. | 11 3/4 | 39·4 | 24·2 | 5·8 | 3 | 33 | |
| N. J. Kersnovske, Mungar | 13 | 36·3 | 22·3 | 6·6 | 3 | 31·9 | |
| M. H. Fielding, Mungar .. | 16 | 29·1 | 17·8 | 7·27 | 6 | 31·07 | |
| E. Nugent, Coal Creek, Esk | 14 1/2 | 35·0 | 21·5 | 7·2 | 2 | 30·7 | |
| G. J. Nolan, Fernvale .. | 13 | 29·5 | 18·1 | 5·3 | 3 | 26·4 | |
| J. P. Elliott, Woodford .. | 14 1/4 | 27·5 | 16·9 | 7·1 | 2 | 26·0 | |

RESULTS OF JUVENILE CORN-GROWING COMPETITION, 1920-21—*continued.*

| Name of Competitor. | Age. | Yield per Acre in Bushels. | Points Awarded for Yield—Maximum Points, 75. | Quality of Grain and Uniformity of Ear—Maximum Points, 15. | Records and Field Data—Points, 10. | Total Points—Maximum 100. | Remarks. |
|---|---|---|---|---|---|---|---|
| **No. 3 District.** | | | | | | | |
| T. A. Smoothy, Pinelands | 17 | 113·3 | 69·6 | 10·1 | 6 | 85·7 | 1st, £5. |
| H. Morgenstein, Pinelands | 18 | 76 | 46·7 | 10·6 | 4 | 61·3 | 2nd, £2. |
| J. Morgenstein, Pinelands | 13 | 64·4 | 39·5 | 9·1 | 5 | 53·6 | 3rd, £1. |
| M. Thies, Pinelands .. | 13 7/12 | 62·03 | 38·1 | 8·0 | 1 | 47·1 | |
| C. J. Burgess, Pinelands .. | 12 | 53·3 | 32·7 | 8·7 | 3 | 44·4 | |
| L. P. Walker, Glenaven .. | 14 1/4 | 49·2 | 30·2 | 7 | 6 | 43·2 | |
| C. Thies, Pinelands .. | 17 1/2 | 47·3 | 29·0 | 9·6 | 4 | 42·6 | |
| F. W. Pagel, Ma Ma Creek | 13 | 16·3 | 10·0 | 7·1 | 1 | 18·1 | |
| **No. 4 District.** | | | | | | | |
| C. W. Rackemann, Tingoora | 11 3/4 | 74·9 | 46 | 8·6 | 5 | 59·6 | 1st, £5. |
| H. G. Rackemann, Tingoora | 14 1/2 | 71·8 | 44·1 | 9·8 | 5 | 58·9 | 2nd, £2. |
| F. P. Farr, Reedsdale .. | 14 11/12 | 71·8 | 44·1 | 6·7 | 4 | 54·8 | 3rd, £1. |
| C. Black, Kumbia .. | 9 | 55·7 | 34·2 | 6·8 | 3 | 44 | |
| A. Mickan, Silverleaf, *via* Murgon | 18 | 42·1 | 25·8 | 10·27 | 6 | 42·07 | |
| E. Nebe, Coolabunia .. | 14 5/12 | 43·3 | 26·6 | 8·9 | 6 | 41·5 | |
| M. Black, Kumbia .. | 10 | 46·6 | 28·6 | 6·9 | 3 | 38·5 | |
| V. L. Wenck, Booie road, Kingaroy | 15 | 40·0 | 24·5 | 7·5 | 3 | 35·0 | |
| E. W. Davy, Wattle Grove | 13 | 37·6 | 23·1 | 7·7 | 3 | 33·8 | |
| M. E. McNickol, Wooroolin | 15 | 32·3 | 19·8 | 7·5 | 4 | 31·3 | |
| S. J. Davy, Wattle Grove | 10 11/12 | 29·2 | 17·9 | 7·1 | 3 | 28·0 | |
| **No. 5 District.** | | | | | | | |
| W. Gon Chee, Killarney .. | 17 | 96·2 | 59·1 | 10·2 | 8 | 77·3 | 1st, £5. |
| B. Gon Chee, Killarney .. | 13 | 88·3 | 54·2 | 8·6 | 5 | 67·8 | 2nd, £2. |
| R. Gon Chee, Killarney .. | 11 1/2 | 70·7 | 43·4 | 8·9 | 5 | 57·3 | 3rd, £1. |
| G. C. Black, Goomburra .. | 16 | 45·3 | 27·8 | 8·77 | 5 | 41·57 | |
| P. Dorfield, Wellcamp .. | 15 5/6 | 42·2 | 25·9 | 7·27 | 7 | 40·17 | |
| E. Geitz, Allora .. .. | 17 | 37·7 | 23·1 | 8·1 | 3 | 34·2 | |
| J. T. Collard, Clifton .. | 11 | 28·4 | 17·4 | 6·97 | 1 | 25·37 | |
| J. W. Collard, Clifton .. | 14 | 21·05 | 12·9 | 7·4 | 3 | 23·3 | |
| A. Hooley, Fletcher's Siding | 14 1/3 | 18·7 | 11·4 | 7·2 | 3 | 21·6 | |
| **No. 6 District.** | | | | | | | |
| W. Meredith, Gurgeena .. | 16 1/2 | 61·7 | 37·9 | 10·8 | 4 | 52·7 | 1st, £5. |
| E. D. Meredith, Gurgeena | 14 1/4 | 61·4 | 37·7 | 10·27 | 4 | 51·97 | 2nd, £2. |
| C. G. Meredith, Gurgeena | 14 3/4 | 44·3 | 27·2 | 5·7 | 4 | 36·9 | * |
| J. U. Meredith, Gurgeena | 12 1/4 | 43·7 | 26·8 | 6·0 | 4 | 36·8 | |
| **No. 7 District.** | | | | | | | |
| V. Kussrow, Rosalie Plains | 13 7/12 | 33·3 | 20·4 | 6·97 | 3 | 30·37 | 1st, £5. |
| T. Dunn, Hunterton .. | 14 | 27·8 | 17 | 6·5 | 3 | 26·5 | * |
| H. J. Stanford, Hunterton | 14 | 26·4 | 16·2 | 7·0 | 3 | 26·2 | |
| **No. 8 District.** | | | | | | | |
| W. H. McLaughlin, Yeppoon | 15 11/12 | 49·1 | 30·1 | 8·4 | 4 | 42·5 | No prize* |
| **No. 9 District.** | | | | | | | |
| S. Favier, Kairi .. .. | 10 | 85·9 | 52·8 | 6·9 | 1 | 60·7 | 1st, £5. |
| C. A. Schroder, Kairi .. | 13 5/12 | 58·3 | 35·8 | 8·3 | 6 | 50·1 | * |
| E. F. Pasetti, Kairi .. | 16 1/12 | 49·4 | 30·3 | 5·9 | 2 | 38·2 | |

**Special prizes** of the value of £10, £5, and £3 will be awarded to the competitors who stand first, second, and third in the entire competition.

**DISTRICT PRIZES.—First, £5 ; Second, £2 ; Third, £1.**

* If there are less than six competitors, prizes will be allotted as follows :—

**Four to five competitors (inclusive), two prizes, first and second.**

**Two to three „ „ one prize only, first.**

When only one competitor, he, or she, will be debarred from participating in the District Prize, but will be eligible to compete for the Special Prizes.

No money prizes will be given, but each successful competitor will be allowed to select some article to the value of his prize.

Photo., "The Week."

PLATE 47.—THE ARENA, GYMPIE SHOW, 1921.


*Photo., "The Week."*]

PLATE 48.—RETURNED SOLDIER SETTLERS' FRUIT DISPLAY, GYMPIE SHOW, 1921.

# Dairying.

## THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RECORDS OF COWS FOR AUGUST, 1921.

| Name of Cow. | Breed. | Date of Calving. | Total Milk. | Test. | Commercial Butter. | Remarks. |
|---|---|---|---|---|---|---|
| | | | lb. | % | lb. | |
| Bellona ... ... | Ayrshire ... | 26 June, 1921 | 1,277 | 4·1 | 58·58 | |
| Thyra of Myrtle-view | ,, ... | 31 July ,, | 1,387 | 3·6 | 55·48 | |
| Iron Plate ... ... | Jersey ... | 12 July ,, | 929 | 5·1 | 55·43 | |
| Prim ... ... | Holstein ... | 9 Mar. ,, | 1,146 | 4·0 | 51·36 | |
| College Mignon ... | Jersey ... | 7 July ,, | 832 | 5·0 | 48·73 | |
| College Cold Iron | ,, ... | 10 Mar. ,, | 783 | 4·4 | 38·67 | |
| Hedges Nattie .. | Holstein ... | 26 Feb. ,, | 832 | 4·0 | 37·18 | |
| Miss Betty ... | Jersey ... | 7 July ,, | 779 | 4·2 | 36·66 | |
| Charming Damsel | Ayrshire ... | 12 May ,, | 627 | 4·0 | 28·51 | |
| Wattle Blossom ... | Guernsey ... | 21 May ,, | 519 | 4·7 | 27·47 | |
| Miss Fearless ... | Ayrshire ... | 21 May ,, | 584 | 3·9 | 25·41 | |
| Confidence... ... | ,, ... | 8 Feb. ,, | 521 | 4·3 | 25·11 | |
| College Cobalt ... | Jersey ... | 6 Jan. ,, | 428 | 5·0 | 25·03 | |
| Hedges Dutchmaid | Holstein ... | 26 May ,, | 597 | 3·7 | 24·58 | |
| Magnet's Leda ... | Jersey ... | 6 Oct., 1920 | 447 | 4·8 | 24·18 | |
| Rosine ... ... | Ayrshire ... | 19 Jan., 1921 | 555 | 5·9 | 24·14 | |
| Lilia ... ... | ,, ... | 3 April ,, | 521 | 4·1 | 23·89 | |
| College Grandeur | Jersey ... | 29 Dec., 1920 | 412 | 4·9 | 23·62 | |
| Netherton Belle ... | Ayrshire ... | 30 Oct. ,, | 487 | 4·3 | 23·49 | |
| Confidante ... | ,, ... | 12 May, 1921 | 464 | 4·5 | 23·46 | |
| Royal Mistress ... | ,, ... | 19 Mar. ,, | 585 | 3·6 | 23·40 | |
| Comedienne ... | Jersey .. | 26 Nov., 1920 | 394 | 5·0 | 23·04 | |
| Hedges Madge ... | Holstein ... | 15 Aug., 1921 | 570 | 3·6 | 22·80 | |
| Dawn of Warragaburra | Jersey ... | 15 Oct., 1920 | 385 | 5·0 | 22·52 | |
| College Ma Petite | ,, ... | 23 Oct. ,, | 367 | 5·2 | 22·33 | |
| Affection of Gowrie Park | Ayrshire ... | 8 Sept., 1921 | 509 | 3·9 | 22·15 | |
| College Meadow Sweet | Holstein ... | 15 May ,, | 512 | 3·8 | 21·67 | |
| Yarraview Village Belle | Guernsey ... | 6 Aug. ,, | 340 | 5·2 | 20·63 | |
| Snowflake ... ... | Shorthorn... | 21 Dec., 1920 | 427 | 4·3 | 20·59 | |
| Thornton Fairetta | Jersey ... | 15 Mar., 1921 | 331 | 5·2 | 20·14 | |

## NEUTRALISATION OF ACID IN CREAM.

By FREDERIC J. WATSON, Instructor in Dairying, Department of Agriculture and Stock.

Owing to the acid condition in which farm-separated cream is delivered to factories, especially during the summer months, it is necessary, in preparing it for pasteurisation, to reduce the acid in the cream to between .2 per centum and .3 per centum.

The complexity of the physical and chemical make-up of cream, its susceptibility to a variety of changes in composition, together with irregularities in the preparation and use of neutralisers, frequently cause fluctuations in the results of neutralisation, and interferes with the desired accuracy of results of neutralisation.

It is, therefore, advisable in neutralising cream, to aim at obtaining a standard of acid of .25 per centum in order that possible fluctuations in results may not endanger the quality of the butter made from the cream.

The following remarks on neutralisation are obtained from the publications on the dairy industry by Otto F. Hunziker, a high American authority on butter manufacture, who has made an exhaustive study of the matter.

## OBJECTS OF NEUTRALISATION.

1. To avoid excessive loss of fats that results from churning cream that is pasteurised while extremely sour.

2. To guard against the production of undesirable flavours in cream, which are prone to result when cream high in acid is pasteurised at a high temperature.

3. To improve the keeping quality of butter made from high-acid cream. (Butter made from high-acid cream does not keep well.)

These are among the objects that can be accomplished by neutralisation. They all hinge on the reduction of the acid in sour cream before pasteurisation.

Improvement of the flavour of butter made from tainted cream, or the removal of rancidity by neutralisation, is not possible. This fact has been conclusively established.

When neutralising cream it is essential that the following particulars should be observed:—

(1) Adoption of a definite standard of acidity.
(2) Correct and accurate test for acidity. (This may be made by means of a decinormal alkali (caustic soda) solution, using phenolphthalein as an indicator.)
(3) Choice and use of the right kind of neutraliser.
(4) Making right strength of neutraliser.
(5) Adding the neutraliser to the cream in the right manner.
(6) Checking of results by retesting.

## NEUTRALISERS.

Neutralisers must have alkaline properties, must be alkalies, or alkaline earths or their carbonates.

Alkali is a substance that neutralises acids, forms salts, and that saponifies fats.

Common alkalies that have found application in factories are carbonate of sodium (soda ash) and of calcium (chalk), bicarbonate of soda (baking soda), hydrate of soda (soda lye), of calcium in the form of lime water and milk of lime, and the oxides of calcium and magnesium (quick lime and magnesium lime).

Carbonate and bicarbonate of soda are readily soluble, and therefore are easily made up into solutions of desired strength. This is a distinct advantage.

Calcium carbonate is very insoluble and slow of action, and therefore unsuitable for the purpose.

All carbonates liberate carbon-dioxide gas when added to sour cream. This is claimed by some to be an advantage, for the reason that when the carbon-dioxide gas is percolating upwards through the cream it carries with it volatile gases with objectionable odours, and thereby removes from the cream undesirable odours and flavours. The extent and value of this claim has been found to be over-rated and the subsequent inprovement of the butter overestimated.

The disadvantage of the use of carbonates and bicarbonates is that they deprive the operator of the ability of checking his work, because the carbon dioxide formed in the cream when these neutralisers are used reacts acid, causing the test to show higher acidity than the lactic acid content of the cream represents.

The generation of carbon-dioxide gas in sour cream by the use of carbonates and bicarbonates often presents mechanical difficulties, causing the cream to foam up and over the vat unless they are used with great care.

Carbonates and bicarbonates are liable to corrode metal surfaces of vats and coils, causing chemical compounds which are injurious to the quality of the cream.

Butter made from cream neutralised with soda lye, sodium carbonate, or sodium bicarbonate is prone to have a soapy flavour. This is especially true of cream of high original acidity and cream in which the acidity is reduced to the neutral point.

Of the hydrates, lime appears to be the only really suitable alkali to use. It is mild in action, does not injure the flavour of the butter if used intelligently, does not appreciably attack metals of vats and other equipment, it tends to form, with that portion of the cream with which it reacts, a precipitate of relatively great

stability and resistance against bacterial action, and it combines with the curd, first rendering that portion of the curd which enters into the composition of the butter less acid, thereby minimising the acidity of the butter and its deteriorating power.

Sodium hydrate, the cheapest form of which is soda lye, has strong caustic properties, and the sodium lactate formed in sour cream has injurious effect on the metal of vats and coils, and causes butter to contain metallic salts detrimental to its flavour and keeping qualities.

With lime hydrate (slaked lime) properly prepared and intelligently used, and using sufficient quantity only to reduce the acidity to .25 per cent. or thereabout, no objectionable flavour effects occur.

Limy flavour in butter is due to the abuse of lime, resulting from inaccurate and faulty methods.

Limy flavour may show when the lime mix is too concentrated and is not adequately diluted when added to cream.

Another common cause of limy flavour, due to over-neutralisation, lies in the fact that when liming is done by guess only, the cream is usually tested after neutralisation, and if the acidity is higher than desired, more neutraliser is added. Since the action of lime is slow and is not completed until after the cream is pasteurised, it is obvious that the acid test made immediately after neutralisation does not indicate the true ultimate acidity of the cream. If more lime is added on the basis of this test, there is a danger of over-neutralisation, resulting in limy flavour and other defects.

Finally, lime is a natural constituent of milk and butter; it is not only harmless, but represents one of the essential minerals required by the human body for maintenance and, especially, for growth.

[Opinions differ as to the use of lime as a neutraliser, and it is not generally recommended by officers of this Department, who prefer bi-carbonate of soda for the reasons already set out by Mr. Watson.—Ed.]

If any portion of the neutraliser, however small, enters into the composition of butter, it is essential that it add to, rather than detract from, the healthfulness and dietetic value of the butter.

From the standpoint of the consumer, therefore, it is not only the least harmful, but, in fact, the most beneficial, and hence the most suitable, alkali for the neutralisation of cream.

On account of its slight solubility in water, viz., to the extent of .137 per cent. in cold water and .075 in boiling hot water, lime in the form of a clear solution of lime in water is unsuitable, for the reason that to reduce acidity in cream from .85 per cent. to .25 per cent. it would require the volume of lime water to be twice the volume of the cream to be neutralised.

It must, therefore, be used as milk of lime. The lime mixture may be made of calcium oxide (quicklime), in which case time must be taken to thoroughly slake it. Or it may be made of lime hydrate (slaked lime).

If incompletely slaked, slaked lime is unsatisfactory, as it generally contains much lime carbonate, which is coarse, does not strain readily, is insoluble, and is slow of action in the cream.

Thirty-seven pounds of dry lime hydrate will neutralise 90 lb. of lactic acid, hence the amount of lime hydrate required to neutralise .01 lb. or .01 per cent. of lactic acid in 100 lb. of cream is .00411 lb.

But the lime hydrate is not added to the cream in dry form, but as milk of lime, consisting of 2 lb. of lime in 1 gall. of mixture; therefore, the amount of lime mixture required to neutralise .01 per cent. of lactic acid in 100 lb. of cream is .01644 lb.

Example:—2,000 lb. of cream contains .6 per cent. of acid which is required to be reduced to .25 per cent.

| | |
|---|---|
| Original acid in cream .. .. .. | .6 per cent. |
| Acid required .. .. .. .. | .25 per cent. |
| Acid to be neutralised .. .. .. | .35 per cent. |

Therefore, lime mixture = .35 × 2,000 × .01644 = 11.5 pints.

However, neutralisation of sour cream and neutralisation of an aqueous solution of lactic acid are two vastly different things; and it has been conclusively demonstrated, by the authority abovementioned, both by laboratory and factory tests, that while in aqueous acid solution the neutralising action of lime is complete, in cream

not all the lime added goes to neutralise the lactic acid present. These tests have shown that for neutralisation purposes it is necessary to use in the neutraliser mixture 2.4 lb. of lime instead of 2 lb.; or to use a type of hydrated lime which has a stronger alkalinity, such as magnesium lime, which contains, in addition to calcium hydrate, 30 to 50 per centum of magnesium oxide, and their actual neutralising strength averages 16 per cent. to 20 per cent. greater than hydrated lime containing 100 per cent. of calcium hydrate.

When using magnesium lime, 2 lb. in the gallon of mixture is sufficient.

The reason for the incomplete reaction of lime in cream is due to the affinity of lime for curd. While the lime is capable of, and does, exert its full neutralising strength in aqueous solutions of lactic acid, a portion of the lime (about 16 to 20 per cent.) when added to cream fails to act on the lactic acid.

In explanation of this, it is well known that casein has a marked affinity for calcium. In raw sweet milk and cream the casein is present as a calcium salt. When cream becomes sour, the lactic acid thus formed removes calcium from the casein. This leaves a part of the casein as free casein, which is a solid, and a part occurs as casein lactate, which is in colloidal state.

The casein lactate, however, is readily hydrolised; upon neutralisation it is precipitated, becoming solid, so that from the standpoint of neutralisation of cream it may be considered equivalent to free casein.

When lime is added to the sour cream the concentration of the acid is very greatly reduced, and the concentration of the casein increased to excess. In the presence of free casein these conditions are most favourable to the formation of calcuim caseinate.

Since both the lime, in the form of milk of lime, and the casein are in a similar physical state, and have a specific chemical attraction for each other, it appears unnecessary for the calcuim to go into solution in order to react on the casein.

## SUMMARY OF THE ACTION OF LIME ON CREAM.

1. When a sufficient amount of lime is added to sour cream to theoretically reduce the acidity in cream to .25 per centum, and the lime fails to accomplish the full extent of this reduction, about 16 to 20 per centum of the lime does not react.

2. This delinquency may be corrected by using approximately 20 per centum more lime hydrate, thus making the lime mixture about 16 per centum stronger than required theoretically, or by using magnesium lime instead of calcium lime. Magnesium lime containing 35 to 50 per cent. of magnesium oxide has an alkalinity equivalent in strength to approximately 116 per cent. to 120 per cent. of pure calcium lime.

3. Lime has a marked affinity for casein. The absorption of lime by the casein, and the reduction of the casein acid, are greater than the absorption of lime by the serum, and the reduction of the lactic acid.

4. When neutralisation is carried to the neutral point, the distribution of the neutralising action in the components of the cream—the serum, curd, and fat—is similar with sodium hydrate as it is with lime water.

5. The acid test of the cream determines the total acidity of the cream, including both the casein acid and the lactic acid.

6. The deficiency of the neutralising action of the lime is due to physical and mechanical combinations between portions of insoluble lime and curd. The fact that from 16 per cent. to 20 per cent. of the lime does not react in the cream must be attributed to the great affinity of the lime for casein, particles of lime adhering and becoming permanently attached to particles of free casein. In this condition the lime so held is unable to exert its full neutralising action.

## INSTRUCTIONS FOR NEUTRALISING WITH LIME.

1. Secure hydrated lime (slaked lime) that is relatively free from carbonates.

If the hydrated lime is a calcium lime (containing not over 5 per cent. of magnesium oxide), make up a lime mixture, or milk of lime, by using 2.4 lb. of the dry hydrated lime for every gallon of mixture.

2. If the hydrated lime is a magnesium lime containing not less than 30 per cent. to 35 per cent. of magnesium oxide, make a lime mixture, or milk of lime, by using 2 lb. of the dry hydrated lime for every gallon of mixture.

3. Magnesium lime is more satisfactory than calcium lime.

4. For making up lime mixture in small quantities, use a 10-gall. can; put into the can 24 lb. of calcium lime, or, preferably, 20 lb. of magnesium lime; fill half-full of water until emulsion is complete; then fill the can with water, and stir again. This now represents the milk of lime, lime mixture, or lime neutraliser.

Use the method abovementioned to calculate the quantity of the neutraliser required to reduce the acidity of the cream to .25 per cent.

7. Thoroughly stir the lime mixture in the can, and then measure out with a gallon measure, graduated to half-pints, the required amount of neutraliser, as indicated by the method of calculation abovementioned.

8. Strain it through a cheese cloth with a garden sprinkling-can, add an equal amount of water, and sprinkle the neutraliser over the cream in all parts of the vat.

9. Keep the cream agitated while the neutraliser is being added.

10. Always make sure that the quantity of cream and the test of original acid are correct, that the milk of lime has been properly mixed before removing the required amount from the lime-mixture can, and that the neutraliser is properly diluted before it is added to the cream.

11. It is advisable not to heat the cream above 90 degrees Fahr. before the neutraliser is added.

## RAPID METHOD OF DETERMINING EXCESSIVE ACIDITY IN MILK.

By J. C. BRUNNICH and E. GRAHAM.

As it is a requirement of the "*Dairy Produce Act of* 1920" that all milk delivered to a cheese factory for cheesemaking purposes shall be graded in accordance with its quality, and that no milk containing more than .25 per cent. of acidity (lactic acid) shall be classified as first grade quality by a milk-grader at a cheese factory, there is occasioned a need for a rapid method of ascertaining the individual supplies of milk which may contain acidity in excess of that prescribed under the Act, and to this end we have devised a method, full particulars of which are given below.

### APPARATUS.

The apparatus, which was made under our instructions by Messrs. Wilson and Nafis, consists of one 50 c.c. burette, graduated in the customary way in c.c. and one-


Plate 49.—Acidity Tester

fifth part c.cs., and on the left side, marked to show 2.5 c.cs., the burette being fitted with an ordinary pinchcock and fixed on a stand. A set of test tubes in a stand is provided. Each test tube has a frosted top to enable a distinguishing mark being applied to it for identification purposes, and has two graduation marks, the lower one to correspond to 2.5 c.cs., and the upper one to 11.5 c.cs. One metal measure to hold approximately 9 c.cs. of milk, one bottle of deci-normal $\frac{N}{(10)}$ alkali solution, and one drop bottle containing phenolphthalein.

## METHOD OF MAKING A TEST.

The burette is charged with alkali solution and 2.5 c.cs. of same is run into each of the required number of test tubes. A sample of milk is drawn from each can after the contents are well mixed, by the aid of the metal measure, and this complement of milk is discharged into the test tube, filling the tube to the level of the higher graduation mark. The alkali solution and milk are then thoroughly mixed by closing the top of the tube with the thumb and inverting the tube several times. Afterwards a couple of drops of phenolphthalein is added to the mixture in the test tube, and at this stage it is well to observe if any pink colouration appears. The tube is again shaken, and if the colouring completely disappears it is evident that the milk contains a greater amount of acidity than is prescribed under the Act as applied to milk of first-class quality. On the other hand, where the more or less pinkish colour remains, a comparatively lower percentage of acidity is indicated, in which case the milk may be accepted as containing a lower percentage of acidity than is mentioned in the Act.

This completes the test, but should it be desirable to determine the actual percentage of acidity in the milk, the same apparatus may be used, and a slightly different method is to be followed by placing 9 c.cs. of milk, preferably measured with a 9 c.c. pipette (to be ordered specially) into a porcelain dish, adding to it several drops of phenolphthalein, and stirring the mixture with a glass rod, which can be obtained, showing in its interior a pink coloured paper of the exact tint to which the milk should be coloured, by the addition of the necessary amount of alkali run out from the burette.

Then, by reading the number of c.cs. of alkali discharged from the burette, and dividing same by 10, the actual percentage of lactic acid contained in the milk is ascertained.

A photograph, for the purpose of showing the complete apparatus necessary for the test, appears in conjunction with this article.

*Photo. Live Stock Bulletin.*]

Plate 50.—Charmer 2nd of City View (I.M.S.), the Property of Mr. M. Lawrence.

Winner of the Royal National Champion Butter Fat Test, 1921.

Plate 51.—Gaiety of Marinya, the Property of Mr. J. H. Fairfax.
First Prize Ayrshire Cow, 5 years or over, in milk; and Champion, Brisbane Exhibition, 1921.

Plate 52.—Maggie 3rd of Nestles, the Property of Nestle's and Anglo-Swiss Condensed Milk Company.
Winner of Class for Cow yielding largest supply of milk in 48 hours, Brisbane Exhibition, 1921.

PLATE 53.—LARKSPUR, THE PROPERTY OF MESSRS. W. D. CARR.
First Prize Cow, 5 years old and over, in milk; winner of the Special Prize for Cow and three of her progeny; and Champion Jersey Cow, Brisbane Exhibition, 1921.

PLATE 54.—OXFORD GOLDEN BUTTERCUP, THE PROPERTY OF MR. E. BURTON.
First Prize Jersey Heifer, 2 years and under 3 years, in milk; 1st in Class for Heifer any breed, under 4 years, averaging the greatest daily yield of butter-fat for 48 hours,

*Photo. Live Stock Bulletin.*]

PLATE 55.—LYNDHURST ROYAL PEER 24TH, THE PROPERTY OF MR. C. E. McDOUGALL.

First Prize Shorthorn Bull, 18 months and under 2 years. Royal National Association Exhibition, 1921.

*Photo. Live Stock Bulletin.*]

PLATE 56.—PROUD PEER OF TOLARNO, THE PROPERTY OF MR. G. C. CLARK

Champion Aberdeen Angus Bull of Queensland, 1921.

Plate 57.—Friesian Herd of Cattle, Brisbane Exhibition, 1921.

*Exhibitors whose Herds were represented*:—Queensland Agricultural College, S. H. Hosking, Nestles and Anglo-Swiss Condensed Milk Company, Grindles Ltd., Geo. Newman, P. P. Falt, F. G. Brown, C. Behrendorff, A. A. Petrie, A. G. Muller, E. C. McConnel, E J. Wecker, W. G. Reading.

# The Horse.

## CERTIFICATES OF SOUNDNESS.

August list of Stallions registered and certified as sound.

| Name of Stallion. | Owner. | Address. |
|---|---|---|
| **Draught Stallions.** | | |
| Pride of Glenore .. | J. H. Kilvington .. | Forest Hill |
| Phœnix .. .. .. | Jondaryan Estate .. | Jondaryan |
| Clansman .. .. | F. J. Bishop .. .. | Herston Road, Kelvin Grove |
| King Arthur (L) .. | Queensland Agricultural College | Gatton |
| Donald Crystal (L) .. | L. E. Walker .. .. | Brisbane |
| **Blood Stallions.** | | |
| Count Savin (L) .. | J. McGilp .. .. | Dalby |
| Delinacre (L) .. .. | L. Winten .. .. | "Vuna," Whitewood |
| **Trotting Stallions.** | | |
| King Bells .. .. | R. Cox .. .. .. | Toowong |
| St. Malo .. .. | J. W. Hart .. .. | Blackbutt |
| Major Marcus .. .. | Rees, Thomas, Ltd. .. | Townsville |
| Tommy Holmes (L) .. | A. W. Baulch .. .. | Biggenden |
| Ribbonmont (L) .. | A. R. Carr .. .. | Zillmere |
| **Ponies.** | | |
| Tibby (L) .. .. | R. Hanlon .. .. | Kangaroo Point, Brisbane |
| Comet (L) .. .. | E. J. Harris .. .. | Park Road, South Brisbane |

## BOT FLY.

By A. H. CORY, M.R.C.V.S.

To prevent the flies from finding a suitable lodgment for their eggs, the long hairs should be clipped off or singed from the nose, lips, jaws, shoulders, and legs of all horses. Regular daily grooming should be carried out to detach any fly eggs before they have time to hatch, and the parts from which the long hairs have been removed should be smeared daily with a mixture of linseed oil 20 parts, turpentine or kerosene 1 part. All manure containing bots or grubs should be destroyed by burning.

After a horse is affected, viz., when the bot fly grubs are in the stomach, medicines are of little service in removing them until the summer months, when they are being naturally expelled. It is then advisable to drench with one of the following drenches:—

(1) Turpentine 2 oz., mixed in 1 pint of milk; or

(2) Carbolic acid 2 drachms, glycerine 2 oz., water 4 oz., milk 1 pint.

Either of these drenches should be followed in a few hours by giving 5 drachms of aloes, as a ball, or 1 pint of raw linseed oil.

# Poultry.

## REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, AUGUST, 1921.

There was during August a seasonable increase in production. During the latter portion of the month the eggs were weighed, and full details of weights will appear in the report for September. There was one death during the month, Mrs. Anderson's "C" hen dying of tuberculosis. The laying of W. Becker's pen of Langshans was excellent, the total of 166 being the highest monthly score during the present test. For thirty-two days this pen of six birds did not lay less than five eggs per day. The following are the individual records:—

| Competitors. | Breed. | Aug. | Total. |
|---|---|---|---|
| **LIGHT BREEDS.** | | | |
| R. Gill | White Leghorns | 138 | 628 |
| *W. and G. W. Hindes | Do. | 142 | 602 |
| *J. M. Manson | Do. | 147 | 601 |
| H. C. Thomas | Do. | 120 | 596 |
| F. Birchall | Do. | 123 | 588 |
| Oakleigh Poultry Farm | Do. | 129 | 574 |
| *G. Trapp | Do. | 125 | 572 |
| *Mrs. R. Hodge | Do. | 133 | 562 |
| *C. M. Pickering | Do. | 120 | 547 |
| *H. Fraser | Do. | 117 | 542 |
| *H. C. Towers | Do. | 126 | 542 |
| R. C. Cole | Do. | 119 | 541 |
| *J. W. Newton | Do. | 106 | 524 |
| W. A. Wilson | Do. | 121 | 522 |
| *W. Becker | Do. | 134 | 508 |
| *T. Fanning | Do. | 118 | 498 |
| *Chris. Goos | Do. | 121 | 493 |
| Mrs. E. White | Do. | 131 | 490 |
| H. Stacey | Do. | 127 | 487 |
| Bathurst Poultry Farm | Do. | 118 | 487 |
| *E. Chester | Do. | 113 | 485 |
| *R. C. J. Turner | Do. | 117 | 480 |
| M. F. Newberry | Do. | 120 | 475 |
| O. C. Goos | Do. | 111 | 470 |
| W. Barron | Do. | 103 | 469 |

## EGG-LAYING COMPETITION—*continued.*

| Competitors. | Breed. | Aug. | Total. |
|---|---|---|---|
| **LIGHT BREEDS—*continued.*** | | | |
| *Thos. Taylor ... ... ... ... | White Leghorns... ... | 117 | 467 |
| Mrs. E. Z. Cutcliffe ... ... ... | Do. ... ... | 113 | 464 |
| E. Stephenson ... ... ... ... | Do. ... ... | 106 | 461 |
| J. W. Short ... ... ... ... | Do. ... ... | 109 | 456 |
| *Thos. Eyre ... ... ... ... | Do. ... ... | 110 | 455 |
| *S. L. Grenier ... ... ... ... | Do. ... ... | 124 | 453 |
| *G. Williams ... ... ... ... | Do. ... ... | 124 | 449 |
| *B. Chester ... ... ... ... | Do. ... ... | 113 | 417 |
| *Mrs. L. Anderson ... ... ... | Do. ... ... | 109 | 413 |
| *Haden Poultry Farm ... ... ... | Do. ... ... | 112 | 434 |
| *W. and G. W. Hindes ... ... ... | Brown Leghorns... ... | 120 | 432 |
| *E. A. Smith .. ... ... ... | White Leghorns ... | 119 | 430 |
| Linquenda Poultry Farm ... ... | Do. ... ... | 124 | 427 |
| W. M. Glover ... ... ... ... | Do. ... ... | 108 | 396 |
| *H. P. Clarke ... ... ... ... | Do. ... ... | 110 | 387 |
| Brampton Poultry Farm ... ... | Do. ... ... | 101 | 358 |
| **HEAVY BREEDS.** | | | |
| T. Fanning ... ... ... ... | Black Orpingtons ... | 158 | 667 |
| Jas. Potter ... ... ... ... | Do. ... ... | 111 | 634 |
| *J. Ferguson ... ... ... ... | Chinese Langshans ... | 147 | 612 |
| Rev. A. McAllister ... ... ... | Black Orpingtons ... | 142 | 596 |
| *T. Hindley ... ... ... ... | Do. ... ... | 129 | 588 |
| Jas. Every ... ... ... ... | Langshans ... ... | 135 | 575 |
| *A. E. Walters ... ... ... ... | Black Orpingtons ... | 133 | 575 |
| Jas. Ryan ... ... ... ... | Rhode Island Reds ... | 136 | 572 |
| W. Becker ... ... ... ... | Langshans ... .. | 166 | 569 |
| *R. Burns ... .. ... ... | Black Orpingtons ... | 144 | 568 |
| G. Muir .. ... ... ... ... | Do. ... ... | 137 | 563 |
| *Parisian Poultry Farm ... ... ... | Do. ... ... | 144 | 553 |
| *C. C. Dennis ... ... ... ... | Do. ... ... | 138 | 550 |
| *E. F. Dennis ... ... ... ... | Do. ... ... | 129 | 524 |
| *J. Cornwell ... ... ... ... | Do. ... .. | 142 | 510 |
| *E. Morris ... ... ... ... | Do. ... ... | 133 | 505 |
| *E. Stephenson ... ... ... ... | Do. ... ... | 122 | 497 |
| *R. Holmes ... ... ... ... | Do. ... ... | 90 | 483 |
| G. Cumming ... ... ... ... | Do. ... ... | 119 | 467 |
| *H. Chaille ... ... ... ... | Do. ... ... | 109 | 414 |
| *Mrs. G. Kettle ... ... ... .. | Do. ... ... | 126 | 436 |
| J. W. Newton ... ... ... .. | Do. ... ... | 138 | 435 |
| *N. A. Singer ... ... ... ... | Do. ... ... | 138 | 431 |
| *J. E. Smith ... ... ... ... | Do. ... ... | 147 | 431 |
| *A. Shanks ... ... ... ... | Do. ... ... | 121 | 413 |
| *E. Oakes ... ... ... ... ... | Do. ... ... | 132 | 367 |
| F. Harrington ... ... ... ... | Rhode Island Reds ... | 135 | 346 |
| T. C. Hart ... ... ... ... | Black Orpingtons ... | 100 | 285 |
| Total ... ... ... ... | ... | 8,599 | 34,438 |

* Indicates that the pen is being single tested.

## RESULTS OF SINGLE TEST PENS.

| Competitors. | A. | B. | C | D. | E. | F. | Total. |
|---|---|---|---|---|---|---|---|
| **LIGHT BREEDS.** | | | | | | | |
| W. and G. W. Hindes | 109 | 89 | 101 | 114 | 111 | 78 | 602 |
| J. M. Manson | 91 | 106 | 109 | 92 | 111 | 92 | 601 |
| Geo. Trapp | 95 | 87 | 94 | 94 | 102 | 100 | 572 |
| Mrs. R. Hodge | 89 | 106 | 105 | 96 | 103 | 63 | 562 |
| C. M. Pickering | 100 | 95 | 87 | 81 | 107 | 77 | 547 |
| H. Fraser | 101 | 79 | 96 | 85 | 95 | 86 | 542 |
| H. C. Towers | 98 | 78 | 93 | 72 | 91 | 110 | 542 |
| J. W. Newton | 93 | 105 | 101 | 80 | 78 | 67 | 524 |
| W. Becker | 98 | 101 | 74 | 76 | 114 | 45 | 508 |
| T. Fanning | 95 | 78 | 83 | 78 | 74 | 90 | 498 |
| Chris. Goos | 87 | 105 | 51 | 57 | 72 | 121 | 493 |
| E. Chester | 85 | 89 | 81 | 77 | 75 | 78 | 485 |
| R. C. J. Turner | 85 | 75 | 76 | 67 | 86 | 91 | 480 |
| Thos. Taylor | 73 | 91 | 77 | 56 | 67 | 103 | 467 |
| T. Eyre | 76 | 77 | 50 | 81 | 89 | 82 | 455 |
| S. L. Grenier | 79 | 100 | 50 | 79 | 75 | 70 | 453 |
| G. Williams | 113 | 84 | 50 | 63 | 67 | 72 | 449 |
| B. Chester | 71 | 70 | 94 | 66 | 87 | 59 | 447 |
| Mrs. L. Anderson | 69 | 87 | 80 | 65 | 84 | 58 | 443 |
| Haden Poultry Farm | 66 | 61 | 73 | 77 | 71 | 86 | 434 |
| W. and G. W. Hindes | 59 | 61 | 54 | 92 | 70 | 96 | 432 |
| E. A. Smith | 102 | 78 | 74 | 70 | 65 | 46 | 430 |
| H. P. Clarke | 100 | 57 | 66 | 39 | 62 | 63 | 387 |
| **HEAVY BREEDS.** | | | | | | | |
| J. Ferguson | 106 | 94 | 89 | 113 | 105 | 105 | 612 |
| T. Hindley | 107 | 97 | 103 | 83 | 105 | 93 | 588 |
| A. E. Walters | 104 | 102 | 89 | 93 | 87 | 100 | 575 |
| R. Burns | 48 | 84 | 125 | 76 | 115 | 120 | 568 |
| Parisian Poultry Farm | 88 | 91 | 91 | 122 | 59 | 102 | 553 |
| C. C. Dennis | 102 | 84 | 74 | 101 | 93 | 96 | 550 |
| E. F. Dennis | 68 | 96 | 84 | 86 | 85 | 105 | 524 |
| J. Cornwell | 83 | 64 | 90 | 101 | 86 | 86 | 510 |
| E. Morris | 86 | 93 | 47 | 105 | 83 | 91 | 505 |
| E. Stephenson | 94 | 76 | 83 | 80 | 72 | 92 | 497 |
| R. Holmes | 63 | 77 | 81 | 96 | 110 | 56 | 483 |
| H. Chaille | 56 | 83 | 74 | 102 | 83 | 46 | 444 |
| Mrs. G. Kettle | 69 | 89 | 101 | 48 | 55 | 74 | 436 |
| N. A. Singer | 70 | 58 | 70 | 74 | 64 | 95 | 431 |
| J. E. Smith | 103 | 104 | 77 | 63 | 47 | 37 | 431 |
| A. Shanks | 43 | 71 | 59 | 77 | 80 | 83 | 413 |
| E. Oakes | 30 | 85 | 63 | 89 | 56 | 44 | 367 |

CUTHBERT POTTS,
Principal.

# Horticulture.

## HORTICULTURAL NOTES.

In the bush-house, caladiums will now need attention. Remove bulbs from storage and carefully scrape off any decay that may be found around base of bulb, and dust same with a little powdered charcoal. Pot in good, rich compost. Do not have the soil too fine. Leave a few peaty lumps, or the fibre portion of rotted turf, a little smallish charcoal and a sprinkling of fertiliser; soil sifted fine sets too hard. Newly potted caladiums do not require much water—just a sprinkle occasionally, gradually increasing as they commence to shoot. When in good growth, they can hardly have too much water, providing the drainage is good. If you have a nice warm corner where the leaves will not get too much of the afternoon sun, caladiums do well in the open ground, making fine plants and developing strong bulbs.

Dahlias will now require attention. Divide up old bulbs. In separating the tubers it is necessary to have an eye to each portion; this can best be obtained by cutting down through the old stem, a piece of which should be left on each bulb. After division, the tubers may be laid in the ground temporarily until the shoots appear, when they can be planted in their permanent positions. Have your stakes ready and place them in position before bulbs are planted; this often saves trouble.

Asters, salvias, and petunias may still be planted out from seed beds. They like a bright sunny position, as also do portulaca, amaranthus, celosia, cockscombs, and zinnias, whilst partially shaded positions are best for asters and balsams.

Remove all spent winter annuals, and prepare ground for abovementioned plants. Keep the hoe or small digging fork going, thus killing weeds and keeping the surface from caking.

## TREATMENT FOR FISTULA.

By A. H. CORY, M.R.C.V.S., Chief Inspector of Stock.

When a fistula on withers is forming, it is customary to apply a blister or hot fomentations. This on rare occasions appears to effect a cure, but in the majority of cases it hastens the swelling and brings it to a head. After it has broken, surgical treatment is required.

The next thing to find out is the direction and depth of the fistula. This is done by using a flexible probe, some 8 or 9 in. in length. Free drainage must now be given by opening along the full length of the probe, or, if thought advisable, an opening can be made at the lower part of the probe, and a seton of tape or other material passed through and tied on the outside. A seton keeps the wound open and assists in draining the cavity, but the first method of opening up is generally found more satisfactory. Both sides of the withers should be opened, if necessary, and any necrosed (dead) tissue removed. The top of withers should not be opened crossways —from side to side—because there is a ligament which runs along the middle line of shoulders from the head. If cut, it causes serious consequences.

The chief points to remember are:—Free drainage, the removal of all dead tissue, and the prevention of pockets where pus can accumulate.

The following lotion should be used every third day on the fistula after it has been opened up, until four applications have been applied:—

| | |
|---|---|
| Corrosive sublimate .. .. .. .. .. | ½ oz. |
| Methylated spirit .. .. .. .. .. | 1 pint. |

This is best applied by soaking some cotton wool or other absorbent material with the lotion, then packing the saturated cotton wool in the fistula. Knives, probes, &c., should be thoroughly disinfected before using, by placing them in boiling water or some disinfectant such as carbolic acid, condy's fluid, &c. Knives and other steel instruments should not be allowed to come in contact with the corrosive sublimate solution.

# Tropical Industries.

## SUGAR: FIELD REPORTS.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the subjoined report (dated 16th September, 1921) from the Northern Field Assistant, Mr. E. H. Osborn:—

*Ayr District.*—All the local mills are now crushing, and it is expected that the tonnages will be better than anticipated. The cane now being harvested from Pioneer and Kalamia (early in August) is of very fair density, some of the figures given to me being as follows:—

| | |
|---|---|
| Plant H.Q. 426 .. .. .. .. .. | 18.67 c.c.s. |
| Plant Badila .. .. .. .. .. | 17.40 c.c.s. |
| Ratoon Badila .. .. .. .. .. | 17.20 c.c.s. |
| Plant S. Singapore .. .. .. .. | 16.00 c.c.s. |
| Plant Q. 855 .. .. .. .. .. | 14.50 c.c.s. |

The main varieties grown are Badila, H.Q.426, N.G.24, 24A, 24B, with a smaller proportion of Q.855, Q.813, Striped Singapore, Q.970, Q.903, Q.1121, Hybrid No. 1, 1900 Seedling, and B.208. A paddock of the lastnamed, belonging to Messrs. Land Bros., Rita Island, looks very healthy. Some splendi Hybrid No. 1 will also be cut on this farm. Upon Mr. Fraser Clark's farm at Jarvisfield, some fine Badila is being harvested. The soil upon this farm is mainly a very deep black loam, and of a wonderfully fertile nature.

Planting is still being carried out. The area of plant cane to be cut this year at Pioneer Mill is represented by about 2,890 acres, but this figure will certainly be exceeded for 1922.

At Kalamia about 2,700 acres of plant cane will be harvested, but so far this year only about 2,300 acres have been planted.

The density figures of the lastnamed mill were very high at the time of my visit, averaging about 16 c.c.s. At Pioneer some very fair Q.855 was being crushed, with a density of 14.55 c.c.s.

An innovation in these localities is the use of windmills for watering purposes. A number is now in use or in course of installation, and are optimistically regarded by users. With the introduction of a cheaper form of irrigation a very large area of good land could be profitably put under cane in this area.

The champion stool of cane at the Ayr Show was a splendid sample of H.Q. 426, grown by Mr. Geo. Taylor, whilst the first prize for best collection of three sticks each, of not more than twelve varieties, went to Mr. H. K. Kastener.

The varieties shown by him were Q.970, Q.903, Badila Seedling, N.G.24, N.G.24A, N.G.24B, H.Q.426, Q.1121, B.208, Q.855, Q.813, and Hybrid No. 1. These comprised a very fine exhibit, well displayed. Another fine exhibit was Messrs. Todd Brothers' three stocks of Plant Badila.

So far the Burdekin district has not suffered very much from pests. Borers were noticed in a few places, and grubs were noticed on the S.E. side of Plantation Creek.

Systematic and regular collection of beetles and grubs does much to minimise this evil.

*Invicta Mill (Haughton Sugar Company).*—The mill is now crushing, and a fair supply of good density cane is going through. So far it is hard to say how the earlier estimates of the crop will turn out. The principal varieties grown are H.Q. 426, Badila, Q.813, Q.855, N.G.24, 24B, and B.208.

In an earlier report I mentioned that Mr. Wright, a local grower, had previously suffered severely from grubs, and after planting the cane he is now cutting, treated it with 40 lb. of arsenic to the acre. He covered the plants with a little soil, used the arsenic on top, and later filled in the balance of the earth. He is now cutting this cane, and it looks far better than any in grubby areas adjoining.

Adjoining the Haughton River are several grub-infested farms, the owners of which are now employing the same measures to control the pest. Mr. Snow, a grower here, when replanting a block that was eaten out as very young plant cane

(although treated with some 40 lb. of arsenic) placed the new plants alongside of the old poisoned ones, and got an excellent strike. He thinks that the grubs were so "busy" with the old plants that they had no time for the new. At present, apart from the railway, all hauling is done per dray. With a tramway system in operation the cane supply would certainly be more assured.

After Ayr, Home Hill was visited. At the State Farm a section is being devoted to canegrowing, and a couple of crates of proven new varieties from the Mackay Experimental Station, and also some Tableland Badila, have been planted out. Irrigation experiments are also planned.

*Inkerman Mill.*—This mill is now in full swing, and promises to have a better tonnage than was expected earlier. The average density is fair, and steadily improving. About 5,320 acres of plant cane will be cut this year, but so far only about 4,400 acres are planted for 1922. The irrigation scheme is being put into operation as rapidly as possible, and its successful completion is anxiously awaited by the growers. Quite a number of new houses are being built.

In a former report I mentioned that Mrs. Hayward, a local grower, had given a block of land a very heavy dressing of filter press obtained from the mill. As a plant crop, the cane only went about 19 tons per acre, but the ratoon crop shows a splendid growth. One half of the block was planted with Badila and the balance with H.Q.426. The latter half looks very poor in comparison with the Badila.

Up the river from the mill Mr. D. Horwood is growing several varieties obtained from the Mackay Sugar Experiment Station on an unirrigated farm. He has Q.813, Q.855, Badila Seedling, Hybrid No. 1, Q.903, Q.1121, and one or two others. This year he is cutting some of it as first ratoons, and among the varieties Q.903 stands out for vigorous growth.

*Herbert River District.*—Two mills are in operation. The cane seems to be going in well and it is all very clean. The principal canes grown are Badila, H.Q.426, N.G.24, N.G.24A, N.G.24B, Innis, H.Q.409, and 1900 Seedling, but the two former are the most favoured varieties by far.

Due to continuous wet, lack of warmth, and also, to an extent, the presence of borers and grubs, the cane has not made as rapid a growth as it should have done, but, even so, a very fair tonnage will have been put through by the end of the season.

It is understood that permission to plant further areas has been granted by the company. Owing to causes mentioned above, a fair area of land has yet to be planted for 1922. A large number of the farmers are now using lime. A very fine class of earth lime can be obtained at about £2 8s. per ton locally, the using of which should soon repay the growers for their outlay. Green manuring and artificial fertilising are also coming into favour. Of the latter, artificial mixed manures, sulphate of ammonia, as well as meatworks manures, are used extensively.

A good deal of interest is being taken here in the work of the experimental stations. Mr. Enticnap and Mr. Wittrup, of Macnade, have just received a quantity of plants from the South Johnstone stations, and have distributed these among neighbouring growers. Mr. Wilkinson, the manager of Macnade, is also carrying out some very interesting experiments in connection with new cane varieties and at present is growing Korpi, Naremo, Oramboo, and H.Q.409.

Long Pocket and Hawkins Creek seem to have suffered more from grubs than other parts of the area. It will be remembered that Mr. F. S. Skinner, of Victoria, used a dressing of about 40 lb. of arsenic mixed with lime, on a two-months-old crop of plant cane, running it through a manure distributor alongside of the cane and covering over with a disc cultivator. Later, he dressed the crop with 2 lb. sulphate ammonia to the acre. Although the paddock had been previously eaten out by grubs, the cane got a good start and continued growing, and at time of writing promises to cut well. Adjoining blocks have suffered severely from grubs. In some paddocks borers were doing damage; "gumming" was also observed in many places.

It must be most strongly emphasised that the utmost care should be taken in selecting plants for seed from any area in which the presence of gum is noticed. If plants are taken from a healthy portion of an infected paddock, it is recommended that they be cut a day or so before using, kept under shelter from rains or heavy dew, and closely examined at both ends before planting; any showing the slightest trace of gum should be discarded.

Among the cane exhibits at the recent local show the most noticeable were some splendid stools of Badila exhibited by Messrs. Dawson Bros. and Messrs. E. and G. Venables. These were exceptionally good and fit to be shown anywhere.

On the Herbert a good deal of planting is done by hand, but among the machines used, Mr. Enticnap's combined driller and planter was noticed doing good work. It is drawn by four or five horses, worked by a man and a boy, and carried enough plants for an 18-chain drill; it is claimed to drill and plant nearly 6 acres per day. A manure distributor may also be worked at the same time.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report (6th September, 1921) from the Southern Field Assistant, Mr. J. C. Murray:—

"*Bundaberg.*—In the course of the month, Bundaberg district plantations have been inspected, including the canegrowing areas of Avondale, Miara, Bingera, Gin Gin and Maroondan.

"In the Bundaberg areas conditions are practically the same as set out in my last report. Cane is cutting satisfactorily, and the young plant crops are making good growth. Frosts have not been severe, but were sufficiently intense to curl the leaves of the cane on several farms, more particularly on the Woongarra side. The following particulars were supplied by Mr. Herbert Young, of Fairymead, regarding his observations during the frosty nights of the month:—

| | |
|---|---|
| Yuban | Frosted |
| D.1135 | Hardly touched |
| E.K.1 | Badly frosted |
| E.K.28 | Badly frosted |
| Q.1098 | Frosted |
| D.10 | Hardly touched |
| H.Q.77 | Frosted |
| Q.470 | Touched |
| Q.694 | Touched |
| C.S.R.3 | Badly frosted |
| Q.812 A | Hardly touched |
| N.G.81 | Frosted |
| Reintroduced D.1135 | Not touched |
| Q.822 | Badly frosted |
| Shahjahanpur | Not touched |

"An outstanding characteristic of the last-mentioned cane is its immunity from frost. This cane is growing rather thinly in the stick, but it is of good content and strikes and stools well. Careful selection of plants by the farmers may, in a few years, bring out the thickening of the individual canes.

"Black Innis is a variety which is being extensively planted this year in the Bundaberg district. It is an early maturing cane of fair sugar content. It is hardly a satisfactory cane in respect to the ratoons, however, and arrows freely about mid-autumn.

"Q.813 and 1900 Seedling are making a good showing on Woongarra and Barolin farms. The latter, however, is rather shyly striking, and is slowly establishing its root system. It is probable that in planting, if the farmer could cut five eye plants instead of three, and then destroy two of the eyes, they would surmount much of the slow-rooting difficulty. This is a surmise, however.

"A general note of satisfaction prevails at present among the growers, as the harvest is progressing without a hitch, and any industrial differences are being amicably settled.

"At Avondale and Miara satisfactory crops are being harvested. The frosts have slightly touched the cane, but the damage is negligible. Whenever there is a lull in cutting operations the farmers are busy preparing for the spring planting. The majority of the growers are planting early in an endeavour to get a twelve months' crop for next year. No disease is apparent. Practically all of the heavier soils on these areas would now be benefited by the use of lime.

"At Bucca, the growers are meeting with more success than has been the case for some years. The crops are well grown and healthy, and the cane that is being cut shows a fairly high percentage c.c.s., with good weight per acre. Long haulage is a drawback, but transport facilities have lately much improved. Varieties that appear to be giving the best returns are D.1135, and on the river banks 1900 Seedling. H.Q. 285 is making a good showing, and on present appearances it would be worth the growers' while to encourage this variety.

"The use of green manures is strongly recommended on Bucca highlands. The soil is deficient in humus.

"Conditions at Bingera are highly satisfactory this year. The cane is cutting with good density and weight per acre, and the different varieties going to the mill are crushing well. 1900 Seedling is giving about the best returns all round, although D.1135, B.156, Mahona, Badila, and Q.813 are canes that are giving good results.

"The cane at Bingera is free from disease—that is, as far as can be seen in the course of ordinary observation. On some areas there, leaf mottling is noticeable, but this ought not to be mistaken for striped leaf disease. This mottling is generally due to adverse soil conditions, and sometimes culminates in an entire yellowing of the

leaf. The symptoms of striped-leaf disease are irregular streaks of pallid green of unequal length and width, but elongated in the direction of the long axis of the leaf, on a background of normal green. This description would enable a farmer to generally distinguish the disease on, say, B.208.

"In the Gin Gin locality there is considerable agricultural activity. In addition to the harvesting, planting and ploughing are in progress, farmers in many cases breaking up land that has not been under cultivation for years. Losses through disease and insect pests are not severe this year, although on isolated patches the moth borer is active.

"On some of the farms the question of rotation of varieties might be considered by the growers. Gumming and striped-leaf disease are nurtured by a careless or indifferent attitude towards changing of varieties. In the Gin Gin district, probably those most profitably planted are D.1135, Black Innis, H.Q.285, and 1900 Seedling. All these varieties are doing well. At Maroondan, 1900 Seedling is cutting very satisfactorily and with good density. This cane could be grown here as a staple variety. B.156 is also a cane of good weight and sugar content at Maroondan. Malagache might also be profitably grown."

# Botany.

## ILLUSTRATED NOTES ON THE WEEDS OF QUEENSLAND.

By C. T. WHITE, F.L.S., Government Botanist.

No. 24.

### WILD SAGE (*Salvia verbenaca*).

*Description.*—A strong-smelling perennial herb. Stems angular, clothed with rather rough hairs. Stems simple or dichotomously branched. Leaves somewhat ovate or more or less oblong in outline, the older and basal ones on long stalks, the upper ones sessile, the surface crinkled, and the edges toothed and crenulate. Flowers small, pale blue, in distinct whorls along a slender spike; each whorl of flowers subtended by two bracts. Fruiting calyx hairy, about four lines long, strongly ribbed. Nutlets ("seeds") at the bottom of the calyx tube, about one line long, nearly black.

*Distribution.*—A common English and European plant now naturalised in most temperate countries. In Queensland it is confined more or less to the Darling Downs.

*Botanical Name.*—*Salvia,* from Latin *salvo,* I save, on account of the common use of the plants as healing and curative herbs. *Verbanaca,* on account of its resemblance to the common Vervain (Verbena officinalis).

*Common Names.*—Wild Sage, Wild Clary, Eye Seed.

*Uses.*—Anne Pratte, in her work, "The Flowering Plants, Grasses, Sedges, and Ferns of Great Britain," where many notes on the uses of British plants are given, says of this one:—"Its seeds when placed in water yield a mucilage which when placed inside the eyelid for a few minutes envelops any particle of dust which may pain the eye; hence the name of the plant—Clary or Clear Eye." Our old herbalists considered it one of the most efficacious of herbs in any complaint of the eyes. A curious preparation of this plant seems to have been a favourite dish with our ancestors. Parkinson (an early English botanist) says:—"The leaves, taken dry and dipped into a batter made of the yolks of eggs, then flour and a little milk, then fried in butter till crisped, served for a dish of meate, acceptable with manie, unpleasant to none." Besides its uses in diseases of the eye, the Wild Clary is recommended for a variety of maladies.

*Eradication.*—So far as observed in Queensland, the Wild Sage is not a particularly aggressive weed, and calls for no special method of eradication.


*Photo. by Dept. of Agriculture and Stock.*]

Plate 58.—Wild Sage (*Salvia verbenaca*).

# FLOWERING TREES OF BRISBANE BOTANIC GARDENS.

## *SCHOTIA BRACHYPETALA.*

Natural Order Leguminosae.

By E. W. BICK, Curator, Brisbane Botanic Gardens.

*Derivation.*—From "Flora Capensis," Vol. 2, 273, Harvey and Sonder, 1861. The genus, Schotia, was named by Jacquin in honour of a friend and travelling companion, R. Van Der Schot. There are several species, all being native of South Africa. Some are large shrubs or small trees, whilst others are fairly large trees. The specific name, *brachypetala,* alludes to the small, inconspicuous petals.

*Description.*—The species *Schotia brachypetala* was first described by Sonder (in Linn. Soc., Vol. 23, page 39) as a large shrub or small tree. The largest of three specimens in the Brisbane Botanic Gardens is between 20 and 25 ft. in height, with a spread of over 30 ft. The trunk is sturdy, bark dull brownish-grey, branches long, lower ones somewhat horizontal, that provide a good spreading habit. The young branches are tipped with dark-green bark, mottled with brownish spots and patches at and near the older branches.

*Habitat.*—Natal, in sheltered valleys where the soil is dry and rocky in the neighbourhood of Durban, also at an altitude of 2,000 ft. A very handsome tree when in full flower, well worth cultivating; it flowers in Brisbane in September and October.

*Uses.*—Maitland Woods, in "Natal Plants," p. 390, quotes Mr. Bazley as saying that the timber is very much like walnut, but closer in the grain. A splendid furniture wood, but bad to work, as the dust makes the eyes sore if it enters them. Takes a splendid polish; if unpolished gets much darker; is known as African Walnut.

*Leaves* alternate, pinnate, leaflets large ovate, oblong, or obovate, netted veined, in from four to five pairs, varying considerably in shape and size, the smallest being about ¾ in. long, ½ in. wide, the larger varying from 1½ to 2¾ in. long, 1 to 1½ in. in width, sometimes tapering, sometimes truncate at base, always conspicuously, though not prominently, veined.

*Flowers.*—Panicles axillary and terminal, many-flowered; flowers pedicellate, calyx tube conical; petals, *very minute,* linear, hidden under the calyx lobes, stamens ten, monodelphous, ovary flattened elongated oval, about in centre of long stipe. The individual flowers, when open, are about 1½ in. in length, all parts of which are of a rich crimson colour. They are borne in dense clusters on both the larger and smaller branches on the inside of the tree; this gives it a somewhat unique appearance, and as many of the terminal shoots on outside of the tree carry foliage instead of flowers as the majority of trees do, the flowers are to some extent hidden. This prevents their being seen at any great distance from the tree, and a close view, practically under the tree, is necessary. From this position when in flower *Schotia brachyuctala* has a fine effect. The flowers appear to be full of honey, as they are a great attraction for large numbers of honey-eaters and other birds.

*Pod.*—These vary very much, often about 1½ in. in length, with a single seed; sometimes 2½ in. in length, with two seeds; and occasionally 5½ in. in length, with several seeds. They are from 1 to 1½ in. in width, seeds about ½ in. in length, not unlike horse beans, with a large yellow fleshy arillus attached to the hilum.

*Propagation.*—From seed. Although such a very free-flowering tree, it does not seed freely, only a small number being collected each year. All three specimens in the Gardens were raised from one packet of seed received from South Africa.

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# DEHORNING CATTLE.

The simplest and most humane way of destroying the horns seems to be to prevent them from developing when the animals are young. This may be done by the use of caustic potash (in the form of sticks), which rapidly destroys the skin and other tissues when kept in contact with them. The method of applying the potash is very simple. The hair is clipped away from the young horn, so that the potash may come in immediate contact with the parts to be treated. The stick of potash is rolled up in a piece of paper, so as to leave one end exposed. The exposed end is moistened slightly and rubbed on the embryo horn for a few seconds, or until the skin begins to smart, care being taken that the whole of the border is included in the treatment. A surface about three-fourths of an inch in diameter will cover the parts in calves a few days old. The best time to apply the potash is between the fifth and tenth days, although it has proved effectual even on the eighteenth day. With older animals a dehorning instrument must be used.

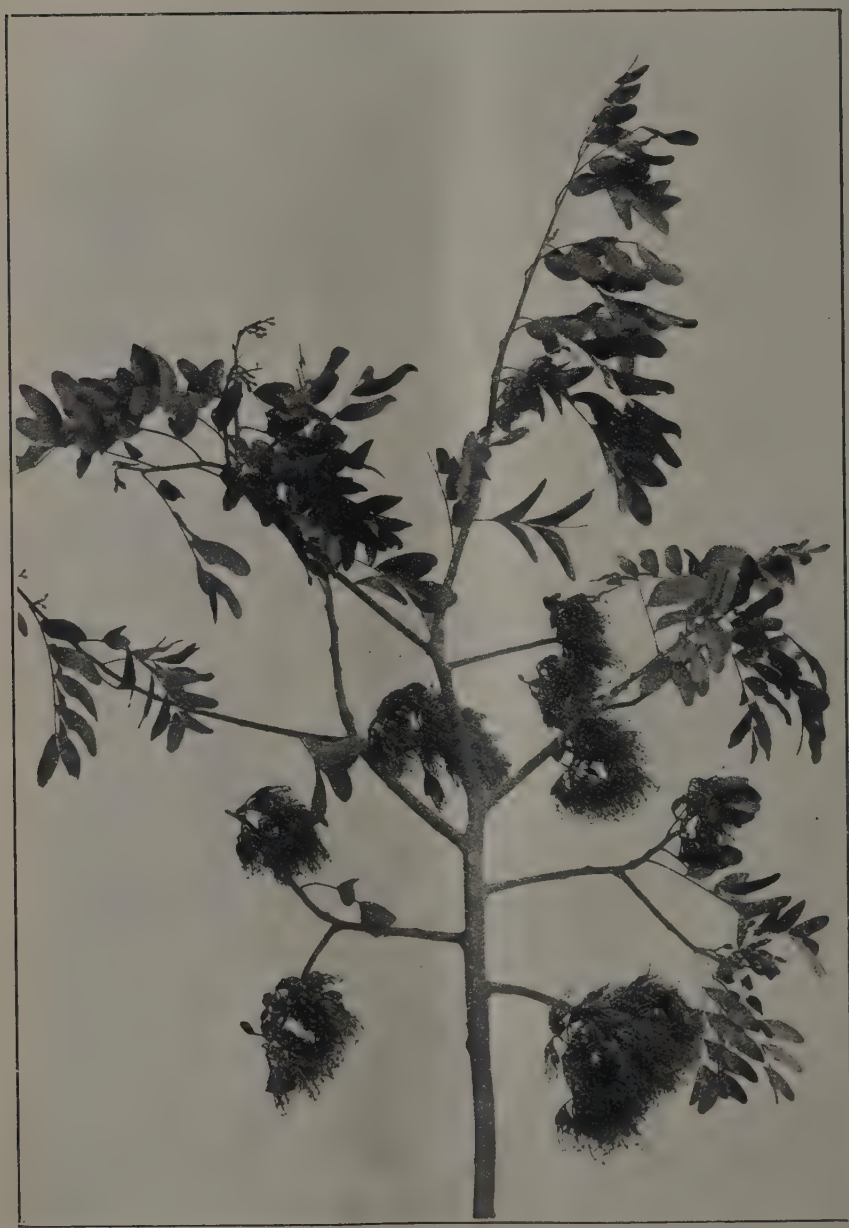

*Photo. Dept. of Agriculture and Stock.*]

PLATE 59.—"AFRICAN WALNUT" (*Schotia brachypetala*).

# Forestry.

## QUEENSLAND TREES.

By C. T. WHITE, Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No. 7.

KODA (*Ehretia acuminata*).

*Common Names.*—Koda, one of the Indian names; Churnwood (North Queensland). The latter name is not to be recommended, as it is more commonly applied to *Villaresia Moorei.*

*Derivation.*—*Ehretia,* after D. G. Ehret; *acuminata,* Lat., meaning pointed, from *acumino,* I sharpen (referring to the pointed leaves).

*Description.*—A large tree attaining a height of about 90 ft. and a barrel diameter of about 2½ ft. Barrel mostly channelled and angular in section, not deeply flanged at the base (at least in Southern Queensland "scrubs"). Bark grey or brown, rather fissured, especially on the ridges of the barrel; when cut, almost white, becoming brown on exposure; 3/16 in. thick on tree, with barrel diameter of 2 ft. 8 in. Sapwood white. Branchlets green, marked by a few white dots (lenticels), and containing a fair quantity of pith. Leaf stalks often grooved on the upper side, varying in length from ½ to 1¼ in. Leaves alternate, in outline egg-shaped or elliptical, varying a fair amount in breadth, margins toothed, lighter green on the underside than above, lateral nerves and netted veins prominent, especially on the underside; measurement of leaf blade, 3 to 6 in. long, varying from two to three times as long as broad. Flowers in bunches (panicles) at the ends of branchlets and in the forks of the upper leaves; panicles shorter or longer than the leaves. Individual flowers stalkless, measuring about ⅛ in. diameter when expanded, white and strongly scented. The lowermost part of the flower, the calyx, is cup-shaped, about 1/12 in. in length, and has five rounded lobes at its rim. On the inside of the calyx are the five petals united at the base in a short tube measuring about 1/12 in. The free part of each petal measures about 1/12 in. in length. Inserted on the inside of the tube of the petals are five bristle-like stamens nearly as long as the petals. The ovary (in centre of flower) is smooth and round, and is surmounted by a bristle-like style about 1/12 in. long, which is forked at the end. Fruit globular, ⅛ to ¼ in. in diameter, splitting vertically into two parts, each part containing two cells, and each cell containing one seed.

Flowering period.—September and October.

*Distribution.*—India, Japan, Philippine Islands, scrubs of the coast of Queensland (north and south), New South Wales as far south as Illawarra.—(Bentham).

*Remarks.*—In the field this tree somewhat resembles the Churnwood (*Villaresia Moorei*) and the Lignum Vitæ (*Vitex lignum-vitæ*). As a rule, the bark is less fissured or wrinkled than the former, and rougher than the latter.

*Uses.*—The timber could be used with advantage for many indoor purposes, such as fittings and cabinet-making. In India it is used for making scabbards, sword hilts, gun stocks, and is employed in building and agricultural implements. The unripe fruit is pickled; when ripe it is insipidly sweet, and is eaten.—(Brandis: "Forest Flora of North-west and Central India"). Professor E. H. Wilson informed us that the wood was preferred in the East above all others for carrying poles.

REFERENCES.

*Ehretia acuminata,* R. Brown. "Prodromus," page 497. Bentham: "Flora Australiensis," Vol. IV., page 387. F. M. Bailey: "Queensland Flora," Part IV., page 1038. Synonyms: *Ehretia serrata,* Roxb.; *Ehretia pyrifolia,* Don.; *Ehretia ovalifolia,* Hassk.

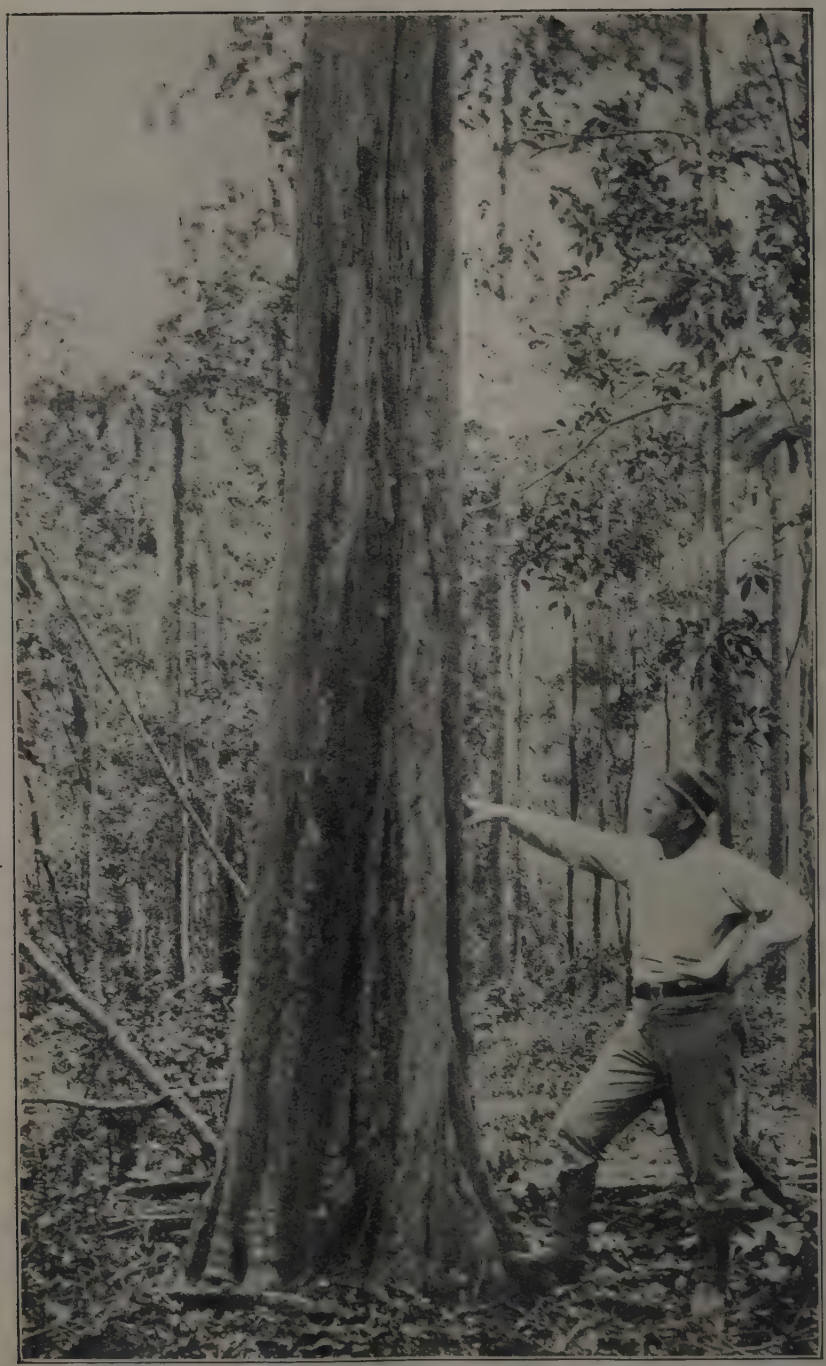

*Photo. by the Authors.*]

Plate 60.—Koda (*Ehretia acuminata*), Imbil Scrubs.


Photo. by Dept. of Agriculture and Stock.]

Plate 61.—Koda (*Ehretia acuminata*).

# Entomology.

## CANE-GRUB CONTROL.

The General Superintendent of the Bureau of Sugar Experiment Stations has received the following report, under date 9th September, 1921, from the Entomologist, Mr. Edmund Jarvis:—

"The present season having been very favourable for planting, some attention has been given to station improvements of a general character, which are best carried out during the winter months. Preparations for the approaching campaign against our notorious cane-grub are now under way, and a few preliminary notes regarding various plans of procedure that may interest growers will, in the future, be included in monthly reports.

"EXPERIMENTATION WITH DETERRENTS.

"It is proposed during the coming season to take up this line of control work, which, although previously touched upon by Mr. Tryon about twenty-five years ago, has not since been followed up or submitted to scientific investigation.

"The use of deterrents has long been advocated by economic entomologists as a method of coping with many kinds of insects, and of late years attempts have been made in other countries to employ this form of control against the white-grubs of root-eating scarabaeid beetles. Our choice of repellants, however, is naturally limited to substances that will not injure the young cane, can be handled without danger, and easily applied, and are inexpensive, or moderately so. Preferably, they should be of manurial value, and admit of application in a dry form.

"Mr. A. J. Draper has kindly given me permission to experiment in this connection on the Carrah Estate, where I have already selected a portion of a block of D.1135, planted last June, that is now about 18 in. high and looking well.

"I need hardly say that this form of control will be directed against the beetle itself, our object being to deter, if possible, the egg-laden female insect from entering the ground to oviposit, by previously rendering the surface-soil around the cane stools obnoxious in some way.

"COLLECTING CANE-BEETLES.

"As already pointed out in a previous report (1915) we must not lose sight of the fact that in problems such as that now facing us, entomologists have always considered that ideal methods are essentially those in which we succeed in capturing the female insects before they have had time to deposit eggs.

"The Cairns Cane Growers' Association published in the 'Post' this month a few suggestions offered by the writer regarding the future collecting of grubs and beetles, and invited canegrowers to freely criticise same and recount their experiences in this direction. Regulation No. 4 of these suggestions stated that grubs should be collected from cane lands only, or in the immediate vicinity of same, and beetles from within a radius of about a quarter of a mile from cane land. Apparently, some of our growers do not even yet realise that leading entomologists, as a whole, after working for over thirty years at the white-grub problem, assert that up to the present no better control method than that of systematic collecting has been discovered. We naturally recommend this method to growers, because it has stood the test of practical application, particularly in Europe and America.

"One of the latest examples of such work is reported from Mauritius, as follows:—'The number of Lachnosterna (cane-beetles) captured in 1919-1920 was under 31,000,000, as compared with over 71,000,000 in the previous year, and is the lowest since 1912-1913. The figures indicate that a control has been established in those areas in which the infestation originated; it is only in the more recently invaded part of the area that the number of beetles taken is still on the increase. This view is corroborated by the results of surveys for the larvæ.'

"In 1914 we collected 22 tons of beetles in the Cairns district, which represents 8,400,000 specimens, a number able to destroy 11,000 acres of cane, which, if producing an average, say, of 15 tons per acre, would mean a loss of 165,000 tons. Since the average annual loss in the Cairns district is estimated to be about 30,000 tons, it appears that the 22 tons of beetles captured in 1914 were capable of causing

injuries amounting to more than five times that of the whole of our annual loss from grub attack. Even if less than one-quarter of these beetles had oviposited in the canefields around which they were collected, we should have prevented the destruction of about 40,000 tons of cane, an amount exceeding that of our annual loss throughout the Cairns district. The above facts are mentioned here, because I hope to show later on that our most badly grub-eaten areas of cane land around Gordonvale have been gradually invaded by this pest, which first started its encroachments about the year 1897.

"With regard to the distance from cane from which beetles might be profitably collected, I think a quarter of a mile would be insufficient. Such limitation, however, would concentrate the work upon an area harbouring beetles that were very likely to trespass on adjoining cane land. If few collectors were employed, the plan would be advisable, while in the event of many hands being available it would be advantageous, I think, to work the feeding-trees further back.

"We know that the beetles will visit cane land half a mile away, but, unfortunately, we do not know whether they will fly twice or three times that distance in order to attack cane. Under normal climatic conditions a mile is probably the limit from which we need fear invasion, but should windy weather chance to occur during nightfall, as sometimes happens, whilst beetles are on the wing (from 8 to 9 p.m.) they are liable to fly to longer distances.

"TRAPPING BEETLES IN THE FIELD.

"In 1916, whilst at Gordonvale laboratory, I pointed out the desirability of capturing female beetles during the critical period of egg-laying, by means of light traps placed among the cane (see 'Australian Sugar Journal,' Vol. VII., page 903) and emphasised the fact that the beetles directly responsible for future trouble were those which, having managed to elude capture from feeding-trees, finally visited the canefields at night time in order to oviposit. Growers are advised to look up this special report. I hope, this season, to devise some new forms of light-traps, based on the design of that figured in the above-mentioned report, but of more simple construction, with which to follow up this line of control.

"PUPÆ OF CANE-BEETLES.

"On the 22nd instant it was found that pupæ of albohirtum had pupated at Greenhills at depths of 10 to 24 in. The soil was rather dry at 6 in. from the surface, but moist and very compact lower down.

"Two small grubs of an undetermined coleopterous insect were located at a depth of 30 in. Later, on the 24th instant, pupæ at Carrah, Meringa, were unearthed at depths varying from 8 to 14 in. The soil in this case was red volcanic, similar in mechanical composition to that tested by the writer on the same estate during October, 1915. In this class of land pupation apparently takes place at an average depth of about 11 in.

"Whilst at Hambledon last May it occurred to me that the control of the pupal stage of albohirtum had never been seriously attempted, and I was interested to find that Mr. A. L. Walker had given this matter consideration, and was of opinion that fumigation with bisulphide might prove beneficial in clearing up pupa-infested land before planting same. On certain areas of grub-eaten land at Meringa I have found pupæ of albohirtum to occur at the rate of about two per stool of cane. Assuming half these pupæ to produce female beetles, and allowing a loss of 20 per cent. of these from attacks of birds and other enemies, we shall find that the beetles arising from each acre of such infested land could produce 64,000 grubs, or enough to destroy 4 acres of cane.

"Preliminary experiments this month with bisulphide against the pupæ have demonstrated that specimens placed in cages of compact soil will succumb to fumigation. Field work will be carried out shortly, and it remains to be seen, primarily, whether the lining of puddled soil spread by the grub over the walls of its subterranean pupal chamber, prior to transformation, will prove to be impervious to the fumes of carbon bisulphide.

"CANE-GRUBS EATING ENGLISH POTATOES.

"One hears suggestions from time to time regarding the advisability of planting English potatoes on our most badly grub-eaten cane lands. In this connection it might be well to mention that some time back (June, 1919) my attention was drawn to what proved to be a rather interesting case of white-grub attack occurring in a vegetable garden at Kamma, near Cairns. The grubs in question, which were none other than those of our Greyback cane-beetle, were found to be hollowing out the

tubers of half-grown potatoes of the variety snowflake that had been planted in April on a plot of greyish clay loam soil, adjoining a block of sugar-cane. In some cases the tubers were nearly consumed, the large third-stage grubs of this pest being located right inside them.

"This fact helps to further substantiate views held by the writer regarding the dietary of grubs of albohirtum.

"PARASITE OF CANE-BORER.

"Steps are being taken to breed in considerable numbers the parasitic tachinid fly (*Ceromasia sphenophori*) for ultimate distribution in canefields at Gordonvale and Babinda, wherever the weevil-borer may be found to occur injuriously.

"It is proposed to obtain specimens needed for laboratory breeding from Babinda, but, if not available from that district, Mossman will be visited."

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## A NEW MOTH-PEST OF SUGAR-CANE AND MAIZE.

LEAF-EATING GRASS-WORM (*Laphygma exempta* Walk.)

By EDMUND JARVIS, Entomologist.

The presence of this insect was first notified by the writer at Meringa, near Cairns, on 18th February, 1920, on which date the caterpillars were more than half grown and causing very noticeable damage to cane leaves and young maize plants.

They swarmed literally in countless thousands over an area of about 100 acres, occurring, however, in greatest profusion on grass-covered roads and headlands.

A small patch of cane (D1135), that chanced to be weedy at the time when these moths were ovipositing, had suffered badly, large fragments having been cut out of the leaf-blades, which had in many cases been entirely devoured, leaving only the mid-rib.

Viewed as a whole from a little distance, the foliage of both maize and sugar-cane appeared ragged (fig. 3), and if the larval stage of this pest had been prolonged for another week or two the affected crops must have been eaten out.

However, three days later (21st February), the caterpillars were fully grown, and I then collected 200 specimens for experimental purposes—a mere fraction of those feeding on an area of less than a square chain. These were at once transferred to a couple of large breeding-cages (100 in each cage), and two days later had all gone under the soil to pupate.

The pupal stage occupied an interval of from seven to eleven days, the first moth making its appearance on 1st March, while during the next five days a total of forty-one moths emerged, viz., twenty-five males and sixteen females. From these 200 larvæ, only 20.50 per cent. arrived at the moth stage. A tachinid fly parasitised 33.50 per cent., and hymenopterous parasites 1 per cent., the remaining forty-five larvæ succumbing, presumably to some obscure bacterial disease.

The following notes from my diary may be of interest, as showing the dates and order in which these moths and parasites emerged:—

Insects Derived from Pupæ of 200 Larvæ of *Laphygma exempta;* Collected 21st February, 1920.

| | | |
|---|---|---|
| 1st March .. | 1 moth (male) .. .. .. | 1 |
| 2nd March .. | 13 moths (8 male, 5 females) .. | 13 |
| 3rd March .. | 21 moths (14 males, 7 females) .. | 21 |
| 4th March .. | 3 moths (1 male, 2 females) .. | 3 |
| 4th March .. | 2 tachinid parasites .. .. .. | 2 |
| 4th March .. | 1 ichneumon parasite .. .. | 1 |
| 5th March .. | 3 moths (1 male, 2 females) .. | 3 |
| 6th March .. | 7 tachinid parasites .. .. .. | 7 |
| 7th March .. | 4 tachinid parasites .. .. .. | 4 |
| 8th March .. | 20 tachinid parasites .. .. .. | 20 |
| 9th March .. | 10 tachinid parasites .. .. .. | 10 |
| 10th March .. | 18 tachinid parasites .. .. .. | 18 |
| 12th March .. | 6 tachinid parasites .. .. .. | 6 |
| 17th March .. | 1 ichneumon parasite .. .. | 1 |
| | | 110 |

The occurrence of this moth in Queensland canefields is of scientific interest, and has not, I believe, been previously recorded.

Dr. Turner was kind enough to identify the species, from specimens bred by the writer.

It would appear to take the place here of the notorious grass-worm (*Laphygma frugiperda* S. & A. that so often attacks cane and cereal crops in other parts of the world.

*Laphygma exempta* Walk. is a native of Africa, where it is known as the "swarming caterpillar," and is destructive to maize, millet, kaffir-corn, oats, wheat, barley, and potatoes.

## DESCRIPTION OF CATERPILLAR (FROM CANE AT MERINGA: FIGS. 2, 3, 4).

General colour dark-brown, with mid-dorsal, two sub-dorsal, and a band below spiracles pale-yellow. Spiracular-band, and area between yellow stripes light-brown or dull brownish-black, irrorated with short yellow lines, blotches, and dots. Prothoracic collar uniform brownish-black with three white stripes. Head reddish-brown; eyes lighter, and indistinctly mottled with yellow; a large white V-shaped mark on face, bordering inner edges of eyes. A large somewhat-raised yellow blotch close to posterior edge of each abdominal spiracle. Ventral surface of body light yellowish-green, dotted with white or brown on area between legs and lower spiracular band. Legs and claspers yellow, the latter with pinkish tips. Length of caterpillar about 25 mm. (1 inch).

Some of the larvæ noticed were grass-green in colour, with the above-mentioned markings and stripes pale-yellow.

## HABITS OF THE CATERPILLAR.

Whilst crawling over bare ground its movements are quick and erratic. The larvæ feed openly in the sunshine on cane leaves, fully exposed to view, as many as a dozen caterpillars being found by the writer on a single small sucker about 1 ft. high. This habit distinguishes them at once from larvæ of the common "army-worm," *Cirphis unipuncta* Haw., which feed mostly at night, and hide during the day among the unfolding heart-leaves of the cane.

The caterpillars of *L. exempta*, when approached closely or touched, usually fall to the ground and remain motionless for a few seconds before crawling away.

## DESCRIPTION OF THE PUPA.

Dark red-brown; the legs, wings, body segments, &c., outlined in blackish; hind margin of abdominal segments 4, 5, 6 reddish-black; frontal half (above spiracles) of segments 4 to 7 punctulate; end of anal segment obtuse, with two terminal short stout spines; stigmata dark, rather large, ovate, and prominent. Length of pupa about 15 mm. (five-eighths of an inch).

## DESCRIPTION OF MOTH. (BRED FROM CANE AT MERINGA.)

*Female.*—Head and thorax dark grey ochraceous, the former with purple-black eyes crossed by a few golden lines; the latter tufted behind with long pinkish-grey scales. Abdomen light silvery-brown. Fore-wings dark grey ochraceous, two indistinct waved lines enclosing central area, three or four short longitudinal streaks near outer margin, and a row of about eight blotches on outer edge of wing deep-brown. Hind wings pilose, pale whitish-yellow shot with light rose-pink; the costal margin with darker scales; nervures, and the suffused edge of outer margin smoky-brown; fringes silvery, clouded basally with brown. Under surface of wings pale silvery-yellow; fore-wing inclined to light grey, hind wing suffused with pink. Legs dark-brown, distal ends of tarsal joints yellow. Length of body 13 mm. (½ in.); wing expanse of male 32 mm., of female 36 mm. (1⅜ in.).

*Male.*—Differs in having the fore-wings lighter grey, and conspicuously blotched with creamy suffusions, as shown in Fig. 1.

## NATURAL ENEMIES OF *LAPHYGMA EXEMPTA* Walk.

*Tachinid Parasite (undetermined)*—

This insect closely resembles a common house-fly in size and general colouration, but differs from it in being clothed with the numerous stout bristles so characteristic of species of Tachinidæ.

Undoubtedly it is by far the most important of the parasites controlling *L. exempta*, and it is mainly through its instrumentality that the late broods of this noctuid are rendered insignificant.

On 3rd March, whilst moths were emerging freely in my breeding-cages (1st to 5th March), I visited the paddock from where the 200 caterpillars had been collected

on 21st February, fully expecting to find plenty of winged specimens, but was rather surprised to see only one moth resting on a maize leaf.

Three days later, when tachinid flies had appeared in the cages, the place was again visited, and upon arriving on the scene at 9.30 a.m. on a cloudy morning (heavy rain having fallen just before daybreak) I was interested to note the presence of an immense swarm of these useful parasites flying in leisurely and erratic manner close to the ground among grass-stems, weeds, &c., or settled on the leaves while copulating. The air resounded with a continuous hum, resembling the musical murmur produced by a swarm of bees on the wing, due to the buzzing of this countless multitude of flies; and one could not help wondering where so vast a host would ultimately breed, seeing that both caterpillars and moths of *L. exempta* were conspicuous by their absence.

Quite possibly this tachinid fly attacks larvæ of *Cirphis* and other related noctuids that occasionally invade our canefields in great numbers.

*Hymenopterous Parasites—*

1. ***Metopius unifestratus*** Mer. Description of male.—Body black, coarsely punctulate, and marked with sulphur-yellow as follows:—Face, first antennal joint, ten blotches of varying sizes on thorax, seven transverse abdominal broad bands diminishing in width towards anal segment, fore and mid-legs, and tarsal and distal portions of hind femora. Antennæ dark red-brown; wings smoky-brown, nervures dark-reddish. Length of body about half an inch.

*Iphiaulax dubitorius* Fabr. (male).—Body, an uniform light reddish-yellow; eyes, antennæ, distal ends of hind tibiæ, black. Wings pale-brown, the basal area and a central transverse band, yellow. Length of body about a quarter of an inch.

Both the above parasites are common here, and probably affect several kinds of lepidopterous caterpillars. The latter species was observed by the writer at Gordonvale in 1915 grossly infesting larvæ of a pyrale moth (Zinckenia), that were defoliating the weed known as "Fat-hen" (Chenopodium sp.) throughout a considerable area.

*Predaceous Beetle—Ophonoides australis* Dej.—Larvæ of this carabid beetle occurred in the affected area rather commonly, while the noctuid caterpillars were feeding, attacking principally those traversing the bare ground between cane stools, but also exploring the leaves at times in search of prey.

Directly one of these eminently predaceous larvæ encountered a caterpillar, it instantly buried its powerful cutting mandibles deeply in the body, near the head, and then simply hung on, while the unfortunate victim, in vain endeavouring to shake off its foe, twisted and rapidly rolled over and over convulsively.

Such struggles seldom lasted more than a minute, at the end of which time even large caterpillars seemed too weak to offer further resistance, and suffered the enemy to greedily imbibe their life-juices until its body had become greatly swollen and could hold no more.

This larvæ, which runs with agility and is exceedingly active and pugnacious, resides underground in small holes or sun-cracks.

Specimens whilst in captivity were fed on noctuid larvæ and pupæ, and soon pupated at the bottom of breeding-cages filled with damp soil.

The pupal condition during March (our hottest month) lasted only seven days; the maximum temperature at the time being about 87 deg. F.

Technical descriptions of the larval and pupal stages of this beetle need not be given here, but I may state that in general appearance the larva is uniformly black, of typical campodeoid form, and slightly exceeds half an inch in length. (See Fig. 5.)

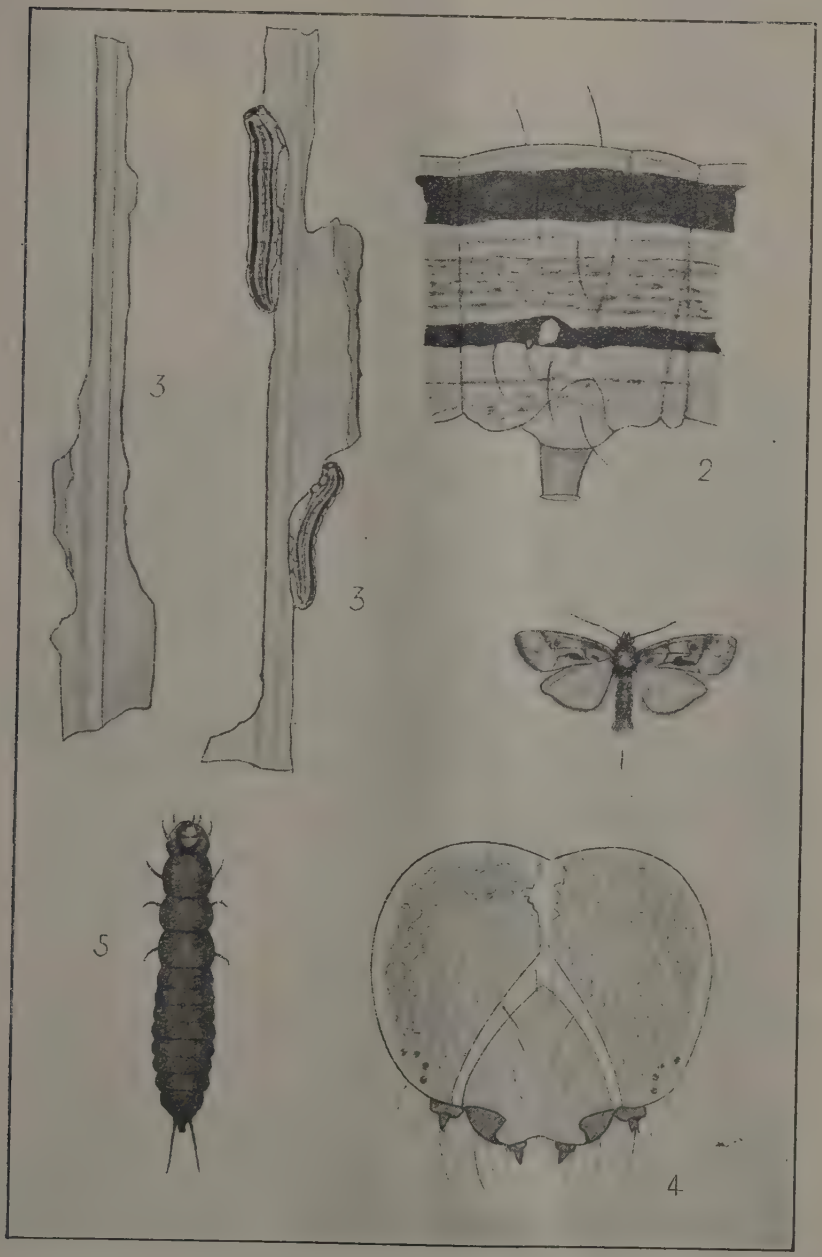
The beetle is about $\frac{5}{8}$ in. long, with prothorax and head shining green, and deeply punctured; wing-cases dark-brown, edged with green, and often suffused with iridescent pink, each elytron with eight parallel rows of punctures. Under surface of body and legs shining black; palpi and basal joints of antennæ reddish-brown.

This insect is common in most canefields, living under clods of soil, stones, &c.; and being, like many species of Carabidæ, most active during night time, and exceeding agile, usually escapes notice.

## REMEDIAL MEASURES.

In the event of this moth-pest proving troublesome in the future, it may be as well to state that action should be taken directly the young caterpillars are first noticed.

The usual procedure is to spray the herbage lying between the swarm and the crop with some poisonous solution.




*E. Jarvis, Del.*

PLATE 62.—LEAF-EATING GRASS-WORM (*Laphygma exempta*, Walk.)

The following formula has been recommended by R. W. Jack, the Government Entomologist of Rhodesia:—

| | |
|---|---|
| Arsenite of soda | 1 lb. |
| Black sugar | 8 lb. |
| Water | 10 gall. |

It is considered that when an attack is concentrated on a limited area it is best to use a spray consisting of arsenite of lime to which is added 3 lb. of black sugar to each 50 gall. of water.

## DESCRIPTION OF PLATE.

(*All Drawings original.*)

Fig. 1.—Moth Pest of Sugar-cane (*Laphygma exempta* Walk., male, natural size).

Fig. 2.—Side view of an abdominal segment of caterpillar, showing disposition of bands, hairs, and light spot against spiracle (magnified).

Fig. 3.—Caterpillar of *L. exempta*, on portion of damaged cane leaf (natural size).

Fig. 4. Head of caterpillar (front view); magnified.

Fg. 5.—Larva of Carabid ground-beetle; predaceous on caterpillars of *L. exempta* (magnified about three times).

# RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of August in the Agricultural Districts, together with Total Rainfalls during August, 1921 and 1920, for Comparison.

| Divisions and Stations. | Average Rainfall. | | Total Rainfall. | | Divisions and Stations. | Average Rainfall. | | Total Rainfall. | |
|---|---|---|---|---|---|---|---|---|---|
| | Aug. | No. of Years' Records. | Aug., 1921. | Aug., 1920. | | Aug. | No. of Years' Records. | Aug., 1921 | Aug., 1920. |
| *North Coast.* | | | | | *South Coast*—continued: | | | | |
| | In. | | In. | In. | | In. | | In. | In. |
| Atherton ... ... | 0·89 | 20 | 0·92 | 0·43 | | | | | |
| Cairns ... ... | 1·82 | 39 | 1·44 | 0·33 | Nambour ... ... | 2·06 | 25 | 1·63 | 1·56 |
| Cardwell ... ... | 1·34 | 49 | 1·38 | 3·93 | Nanango ... ... | 1·49 | 39 | 0·45 | 2·21 |
| Cooktown ... ... | 1·40 | 45 | 0·97 | 0·14 | Rockhampton ... | 1·02 | 34 | 2·66 | 1·52 |
| Herberton ... ... | 0·70 | 34 | 0·61 | 1·41 | Woodford ... ... | 1·92 | 34 | 1·07 | 1·01 |
| Ingham ... ... | 1·43 | 29 | 1·82 | 1·50 | | | | | |
| Innisfail ... ... | 5·41 | 40 | 3·74 | 2·07 | | | | | |
| Mossman ... ... | 1·40 | 13 | 0·79 | 1·49 | *Darling Downs.* | | | | |
| Townsville ... ... | 0·48 | 50 | 0·16 | 1·62 | | | | | |
| | | | | | Dalby ... ... | 1·28 | 51 | 0·37 | 1·69 |
| *Central Coast.* | | | | | Emu Vale ... ... | 1·26 | 25 | 0·36 | 1·53 |
| | | | | | Jimbour ... ... | 1·34 | 33 | 0·94 | 1·69 |
| Ayr ... ... ... | 0·56 | 34 | 0·41 | 2·53 | Miles ... ... | 1·26 | 36 | 0·60 | 1·47 |
| Bowen ... ... | 0·73 | 50 | 0·35 | 2·59 | Stanthorpe ... | 1·92 | 48 | 0·18 | 2·02 |
| Charters Towers ... | 0·54 | 39 | 0·64 | 1·35 | Toowoomba ... | 1·81 | 49 | 0·84 | 1·89 |
| Mackay ... ... | 1·08 | 50 | 0·91 | 3·27 | Warwick ... ... | 1·56 | 34 | 0·50 | 1·84 |
| Proserpine ... ... | 1·31 | 18 | 3·73 | 3·57 | | | | | |
| St. Lawrence ... | 0·93 | 50 | 0·62 | 2·53 | *Maranoa.* | | | | |
| | | | | | Roma ... ... | 0·99 | 47 | 0·83 | 1·48 |
| *South Coast.* | | | | | | | | | |
| | | | | | | | | | |
| Biggenden ... ... | 1·21 | 22 | 1·59 | 0·87 | | | | | |
| Bundaberg ... ... | 1·42 | 38 | 0·85 | 1·45 | *State Farms, &c.* | | | | |
| Brisbane ... ... | 2·17 | 70 | 0·41 | 1·16 | | | | | |
| Childers ... ... | 1·30 | 26 | 1·45 | 1·42 | Bungeworgorai ... | 1·04 | 7 | 0·69 | 1·45 |
| Crohamhurst ... | 2·43 | 25 | 1·45 | 1·39 | Gatton College ... | 1·30 | 22 | 0·22 | 1·32 |
| Esk ... ... ... | 1·66 | 34 | 0·54 | 1·54 | Gindie ... ... | 0·81 | 22 | 1·05 | 1·32 |
| Gayndah ... ... | 1·27 | 50 | 0·59 | 1·41 | Hermitage ... | 1·54 | 15 | 0·27 | 2·06 |
| Gympie ... ... | 1·89 | 51 | 1·30 | 1·52 | Kairi ... ... | 1·19 | 7 | ... | 1·82 |
| Glasshouse M'tains | 1·68 | 13 | 1·45 | 0·67 | Sugar Experiment Station, Mackay | 1·00 | 24 | 0·64 | 3·21 |
| Kilkivan ... ... | 1·61 | 42 | 1·05 | 1·90 | Warren ... ... | 1·14 | 7 | 1·31 | 2·11 |
| Maryborough ... | 1·80 | 50 | 1·02 | 1·90 | | | | | |

Note.—The averages have been compiled from official data during the periods indicated; but the totals for August this year, and for the same period of 1920, having been compiled from telegraphic reports, are subject to revision.

GEORGE E. BOND, State Meteorologist.

# Editorial Notes.

**Efficiency in Dehydration.**

Dehydration continues to hold the attention of fruitgrowers and, though interest does not slacken, a tendency to receive with caution accounts of successful processing and claims for the efficiency of various systems is very noticeable. The wisdom of closely investigating every claim advanced on behalf of any particular type of dehydrator, and analysing every factor making for efficient and economical production, is obvious to every thoughtful producer. A study of the industry, which in Queensland is still practically in embryo, at the present stage of its development will show that its future depends upon four primary factors—standardised production of the highest possible quality; efficient and economical production; an organisation as effective, at least, as those controlling fresh, canned, and sun-dried operations; and a liberal publicity and demonstration campaign. Mr. Arthur W. Christie, Instructor in Fruit Products, University of California, discusses at length the second of these factors in a paper read before the Second Dehydration Convention at Fresno, California, the proceedings of which have been published as a bulletin by the Californian Department of Agriculture. Californian experience and accounts of experiments are of especial value to Queensland fruitgrowers at this juncture, and the embarking upon any scheme or the acceptance of any particular system of dehydration should be preceded by the fullest investigation. It is not possible, in this issue, to completely review the paper referred to, but the subjoined extract, weighted as it is with sound sense, will indicate its general trend:—

"The past season afforded ample opportunity for careful study of the various types of dehydrators in operation, as well as the methods in vogue for handling of fruit before and after dehydration. As might be expected, some types of dehydrators and methods of operation showed decided superiority over others. In obtaining reliable data on the different systems for the dehydration of fruits, it was soon found impossible to accept, in many cases, the statements of manufacturers, owners, or operators. Reliance must be placed on carefully controlled tests made during the operation of the dehydrator under normal conditions. The dehydrator enthusiast seems closely related to the automobile fan who proudly informs you that his car climbs all hills on 'high,' can travel so many miles to the gallon of gasoline, and never was in the repair shop. Just as the condition of weather and roads, the load carried, and the skill of the driver all affect the performance of an automobile, so does the quantity and condition of fruit, the nature of the weather, and the experience of the operator, all affect the efficiency of a dehydrator. Although there is still much need for investigation, the data accumulated during the past season have materially clarified our ideas concerning proper construction and operation of dehydrators."

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**Cassaba Seeds.**

Through the generosity of two subscribers, who received Cassaba seeds through this Department for last season's sowing, we are now able to supply every applicant on our waiting list.

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**Standardising, Advertising, Stabilising.**

Queensland's great capacity for fruit production is every season amply proved, and the necessity of sound business organisation at the commercial end of the growers' enterprise becomes every day more evident. Standardisation of products, wide and judicious advertisement, and stabilisation of markets have become of first importance to producers generally, and more particularly to those engaged in the fruit industry. The fact that first-grade Queensland bananas are at present being marketed in the Southern cities as "Fiji bananas," notwithstanding that importations from Fiji have absolutely ceased, illustrates boldly, in one branch of primary industry alone, the clamant need of well-organised and effective publicity in respect to Queensland's products. Australians should naturally, through the bounty of Nature, be a fruit eating people, and there exists a boundless field for intelligently directed co-operative effort under the three headings suggested. The producer knows what his land can

produce, conditions governing production, and generally how production may be improved. His present problem is how and where to find satisfactory markets for what he does grow. As an effort to add to general information on proved essentials of successful marketing, co-operative and otherwise, the first of a comprehensive series of articles on the selling side of primary industrial enterprise will appear in our next issue.

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**Two Important Measures.** The Regulation of Sugar Cane Prices Acts Amendment Bill and the Banana Industry Preservation Bill, two very important measures, were submitted to Parliament in the course of the month. Each, if finally approved by the legislature, will have far-reaching beneficial effect in two of our most important rural industries.

* * * * * * * *

**The Cane Prices Acts Amendment Bill.** "My sympathies are with the grower all the time, and this legislation was introduced purely and solely to protect the grower." The Minister for Agriculture, Hon. W. N. Gillies, indicated in this remark the main purpose of the Bill. From the viewpoint of national defence and the preservation of the White Australia ideal, canegrowing is the most important agricultural industry in the State, and any measure for its protection and advancement will meet with general approval. The Bill embodies the recommendations of a conference of representatives of the Australian Sugar Producers' Association, the United Cane Growers' Association, and the Chairman of the Central Sugar Cane Prices Board. The beneficial effects of the original 1915 Act and the Amending Act of 1917 are already well known. The canegrower has now a voice in fixing the price of his product, mill deliveries are regulated, the quality of the cane is determined, no indiscriminate deductions may be made, unjust penalties cannot be enforced, payment by analysis is, in nearly every instance, secured, knowledge of profitable varieties is ascertained as the result of an established system of analyses, mill allotments can be organised equitably, mediation in disputes is largely simplified, and compulsory crushing can, in the Minister's discretion, be enforced. The new Bill further safeguards the interests of all concerned in the industry. Perhaps the most important departure in the new measure is in Clause 17, which empowers growers and millers to enter into agreements for a term of years, with a safeguarding provision to the effect that 85 per cent. of the growers must ask for it, and it must be ratified by the Central Cane Prices Board. Power is also given the Central Board to exempt mills from crushing under certain circumstances. Clause 19 provides for appeals from decisions of police magistrates to the District Court judge who is chairman of the Central Board, or to another judge appointed for the purpose. Most of the other amendments clarify sections of the Act and make them more effective and renders their administration more efficient.

* * * * * * * *

**Banana Industry Preservation Bill.** "If there is a protective duty put on bananas it will have the effect of causing coloured labour to engage in the industry. The growers, therefore, have urged me to introduce legislation to keep the industry as 'white' as it is at the present time. . . . It is not the intention of the Government to interfere with any person who is engaged in the industry at the present time. It is desired to get this legislation on the statute-book as quickly as possible, because we have received information that Chinese are buying up land in Queensland and contemplate going in for banana cultivation. They are gradually going in for banana-growing in Queensland again; and just over the border, in New South Wales, the Chinese growers are increasing to an alarming extent." These remarks of the Minister for Agriculture, in introducing the Bill, epitomise its main purpose. Under the protection accorded by the Federal authorities banana-growing in Queensland must expand, and the Bill provides for the full engagement of white people in the industry. The banana is a valuable article of diet, and it is hoped and expected that, as a result of the increased tariff, a very important industry will be built up in this State. It is an industry returned soldiers can engage in, and the Bill provides for, as far as possible, keeping it "white." The most effective are Clauses 3 and 5. Clause 3 provides for the application of the dictation test; and Clause 5 gives power to make regulations, *inter alia*, for the granting of certificates to persons who have passed the dictation test and for the exemption from the Act of any person or class whom, for any reason, it is not considered necessary to examine.

# General Notes.

## PUBLICATIONS RECEIVED.

*The International Review of the Science and Practice of Agriculture* (Rome) for June surveys the world's activities in every branch of agriculture. In a reprint from the *Revista de Agricultura* the influence of fertilisers on the combustibility of tobacco is described. Results of Cuban experiments are tabulated, and, in the course of an account of the influence of each fertiliser used, the author (Moreno, Chemistry Chief, Agricultural Experiment Station, Cuba) draws the following conclusions:—(1) Double superphosphate, sulphate of ammonia, and potassium sulphate increase the combustibility of tobacco. (2) Calcium cyanimide should only be used in small amounts, because larger proportions produce toxic effects. (3) Sulphate is the best potassic fertiliser; the proportion can be increased with advantage to combustibility. (4) Manufactured tobaccos which burn the best are those of homogeneous composition, those with a small bulk and light colour being preferable.

*The Boletin de Agricultura, Industria y Commercio* (Guatemala), No. 2, 1921, contains an interesting description of the cultivation of vanila.

*The Aberdeen Angus Review* (June) has much information on "the premier beef breed of the world," and is of particular interest to cattlemen.

*The American Bee Journal* for July has some interesting notes on the control of the waxmoth, and on early beekeeping history.

*Gardening and Country Life* (South Africa) for September features a valuable article on chrysanthemum culture.

*The Journal of the Department of Agriculture, Union of South Africa*, for August continues a discussion on fodder and pasture grasses of the Union, with special reference to Rhodes grass. "The Castration of Animals with 'Burdizzo Pincers'" is another useful contribution.

*The Rhodesia Agricultural Journal* (August) has among its leading features, "Farm Butter Making," "Crop Rotation and Mixed Farming," and "Ticks Infesting Domestic Animals."

*The Agricultural Gazette of New South Wales* (September) continues its interesting series of reports on farmers' experimental plots. Its other features include the concluding article on "Producing Lucerne Hay under Irrigation Conditions" (F. G. Chomley and F. Chaffey), "An Affection of the Mouths of Sheep" (S. T. D. Symons), "The Value of Soil Analysis to the Farmer" (F. B. Guthrie and R. M. Petrie), "Methods of Maize Breeding for Increase of Yield?" (H. Wenholz), and the concluding paper on "Co-operation for Farmers" (C. C. Crane).

*The Handbook of Horticulture and Viticulture of Western Australia* (3rd ed., 1921) by A. Despeissis, M.R.A.C., is brought out as a result of "the increasing demand and the fresh stimulus given to land settlement under the Scheme for the Repatriation of Returned Soldiers." It is a comprehensive and valuable work.

*The Journal of the Department of Agriculture of South Australia* (August) includes among its more important topics "National Schemes for the Improvement of Live Stock" (W. J. Colebatch).

*The Tropical Agriculturist* (Ceylon) for July contains a full account of the 1921 tractor trials in Ceylon, and some particulars of Adlay—a new grain. "Adlay is a coarse, annual grass, with hard, bead-like and shining grain. . . . An interesting plant in itself, it is of but little economic value."

*The Hawaiian Forester and Agriculturist* for June has an interesting note on the comparative value of split and round fencing posts. "The Forest Products Laboratory of the United States Department of Agriculture says that one will last as long as the other if the percentages of heartwood and sapwood are the same in both. If the percentage of sapwood is increased by splitting, the split post will be less durable, while if the percentage of heartwood is increased it will be more durable than the round one. . . . If the posts are to be treated with creosote or some other preservative, the round post is preferable to the split, because of the comparative ease with which the sapwood can be treated."

*The Agricultural Gazette of Canada* (July-August) has some interesting notes on the development of markets and inspection and grading of produce.

*Safeguarding Farm Stock from Disease* is an important bulletin by Max Henry, M.R.C.V.S., B.V.Sc., issued by the Department of Agriculture and Stock of New South Wales.

# Answers to Correspondents.

## BACON-CURING.

"DIGGER'S WIFE" (Mackay).—There are various methods of curing bacon, and the one for dry curing described hereunder is favoured by many:—

For every 100 lb. of meat take 3 lb. of coarse salt, 2 lb. of brown sugar, 1 lb. of allspice, 2 oz. saltpetre well powdered, and 1 oz. carbonate of soda; mix well together. If the other ingredients are not available, salt and sugar in equal parts, with a little saltpetre, will give good results. If possible, rub the meat first with 1 lb. of honey for every 100 lb. of meat. Then rub with about two-thirds of the preparation until it begins to stick well, which is generally in about seven minutes. The first two days' rubbing is the most important, and unless the meat cures then it is not in a suitable condition. After such rubbing, stack the meat in a tank, first putting a thin layer of salt at the bottom; a layer of sides is put on this with the rind downwards, then another layer is crossed on this, and so on until all the bacon has been put in. After twenty-four hours, turn and rub again, adding a little more of the unused mixture, after which turn and rub once in every forty-eight hours, using a little more of the mixture each time. Place the sides which are on the top to-day on the bottom to-morrow, and so on. After twenty-one days in pickle, it is ready for washing, drying, trimming, and smoking.

Place in water just warm enough to bear one's hand in, and then brush over with a dandy brush, which removes all fat, sugar, slime, &c. Then place in a tank with clean, cool water, for twenty-four hours. This takes the surplus salt out, and renders it mild-cured bacon. Afterwards hang up in a dry place where there is a good draught. If the days are fine and dry, with a slight breeze of wind, the bacon is generally sufficiently dry in about a week.

In trimming the bacon the sharp points of the rib-bones are sawn off, and the remaining part of the fore leg also sawn off level with the shoulder. The knife is then run over the belly part of the rib-bones, and any loose pieces removed. The sweat skin is scraped off with a sharp knife, and the side is then rubbed over with a little olive oil, which gives it a nice glossy appearance.

### SMOKING.

It is then ready for the smoke-house. The walls of the house should be 12 feet high, and the smoke should be conducted to the bacon as cool as possible. Hang the meat close to the top, in rows about 6 inches apart. From four to five days' smoking is given, care being taken not to smoke too much, as this greatly affects the flavour. Hardwood sawdust, damp maize-cobs, branches of eucalyptus free from all traces of gum, or stinkwort gathered with the sap in it and stored till dry, make excellent smoke. Light a small fire on the floor of the smoke-house, and place on it a few handfuls of sawdust. Then lay a sheet of galvanised iron on top, which will cause the fire to smoulder and produce smoke only. About 3 feet above this suspend another piece of galvanised iron, so as to prevent any heat from the fire reaching the bacon. After they leave the smoking-house, it is well to go over the hams and hands with lard and pollard and stop up any place that is likely to be attacked by flies. Finally, place the hams and hands in calico bags, taking care to tie them tightly at the top, and hang them from the ceiling until the weather gets warm. They can then be packed away in perfectly dry bran or sawdust, and should be taken out every six weeks and examined. If there should be any trace of mildew or sweating, it should be rubbed off with a cloth, and a little chaff added to the bran or sawdust. Keep as far as possible an even temperature. Too much heat will cause the fat to melt and turn musty, and if too damp it will sweat and decay. By curing and treating bacon in this way an article can be obtained which will always command a good price and will keep for many years.

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## ALGAROBA SEED.

W. BROTHERTON (Brothertonville, Gladstone) advises that the whole of his stock of algaroba seed has now been distributed.

## CAROB BEAN.

J. W. Jackson (Fitzroy Farm, Etna Creek, Rockhampton) writes:—

"*Carob Bean.*—Some years ago I planted three seeds, from which I have got two trees. They grow all right here, but have not yet come into bearing. I had to transplant the bigger one, as it was growing too close to a citrus tree. Anderson and Co.'s (Sydney) catalogue gives particulars as to seed supplies and prices, which would interest intending growers."

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## TREE IDENTIFIED.

John Locke (Mackay).—The Government Botanist, Mr. C. T. White, F.L.S., to whom your specimen was submitted, advises as follows:—

"The specimen sent is *Grevillea Hilliana*, a tree closely allied to *Grevillea robusta*, as suggested. It is a native of the scrub country of Eastern Australia, from the northern parts of New South Wales to about the Bowen district. In New South Wales it sometimes goes under the name of the White Yiel Yiel, but I have not heard a vernacular applied to it in Queensland. The specific name *Hilliana* is in honour of Walter Hill, the first Government Botanist of Queensland and Director of the Brisbane Botanic Gardens."

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## RATIONS FOR PIGS.

H. B. Barnes (Caboolture).—

(1.) Examples of rations for pig-feeding will be published in next issue.

(2.) *Weaners.*—Note remarks in paragraph 2, page 4, of "Pig Raising in Queensland," by E. Graham and H. C. Quodling; also on page 22, under the heading "Weaners and Slips." Weaners of the age mentioned, 9 weeks, can be reared without skim milk, provided the food is easily digestible, of a suitable nature, and given more in the form of gruel by boiling pollard and maize-meal with approved waste food from the house. Better results, however, will be attained by adhering to advice given in respect to the use of skimmed milk and dairy by-products.

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## MARKET INFORMATION—BANANA INDUSTRY—SUGAR INDUSTRY.

C. H. D. P. (Spring Hollow, Yeppoon).—

### MARKET INFORMATION.

A monthly publication is seldom recognised as a suitable medium for market information as, to be of value, it must, obviously, be both accurate and timely. The Journal cannot reasonably be expected to assume the functions of a daily or weekly newspaper.

### BANANA INDUSTRY.

The imposition of the duty on imported bananas was primarily due to the action of the Queensland Department of Agriculture and Stock, and the Bill now before Parliament, introduced by the Hon. W. N. Gillies, Minister for Agriculture, and which provides for the preservation of the banana industry and other incidental purposes, is a natural corollary of the further action taken by the Federal authorities.

### SUGAR INDUSTRY.

Sugar-growing is the most important agricultural industry in the State, upwards of £15,000,000 being invested in it, and it is not considered that too much space is being devoted to it in the Journal.

## SCOTCH THISTLE (CARDUUS LANCEOLATA).

Inquirer—

The Director of Agriculture, Mr. H. C. Quodling, advises as follows:—

"Thistles should be cut off below the surface of the ground to kill them outright. No doubt quantities of seed have been deposited on the ground, and these will commence to grow at the first favourable opportunity. If it is possible to mow these thistles regularly they can be temporarily kept in check, and in this way the grass will be given a chance to flourish. Thistles usually choke themselves out in the course of two or three seasons, but in this case they will have effected a great deal of damage in the meantime."

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## COTTON SEED AS A STOCK FOOD.—TOBACCO AND LUCERNE SEED.

### COTTON SEED AS A STOCK FOOD.

G.H.B. (Glass House Mountains)—

If you refer to the remarks on the value of cotton seed as stock food in the July issue, you will note that no mention is made of it as pig feed. Though beneficial to cattle and sheep, cotton seed should not be fed to pigs. Cotton seed crushing in an ordinary corncracker is necessarily a comparatively slow process, owing to its tendency to clog in the machine. An adjustment of the rollers might relieve the difficulty. Hard maize crushed with the cotton seed would help to keep the rollers free.

### TOBACCO AND LUCERNE SEED.

Tobacco seed is obtainable from the Department of Agriculture and Stock at 3s. 6d. per oz., postage paid. Varieties on hand are:—*Cigar*—Connecticut, Cuban, and Connecticut Havana; *Pipe and Cigarette*—Broadleaf Gooch, Blue Pryor, and Sweet Orinoco. Lucerne seed is obtainable from any seedsman.

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## TREATMENT FOR DOGS, FOALS, AND CALVES AFFECTED WITH "SCRUB" TICKS.

By A. H. CORY, M.R.C.V.S., Chief Inspector of Stock.

Scrub ticks cause a great deal of trouble to stockowners in certain districts, with a large percentage of mortalities. It has been stated that these ticks do not harm the animals during the first four days' attachment, so it is recommended that where scrub ticks are prevalent, valuable animals should be thoroughly examined every second or third day.

It has been proved that trypan blue, injected under the skin, is a specific for this disease in the dog; the paralysis soon improves, and in a few days the animal thoroughly recovers. One dose of the trypan blue is usually sufficient.

A 2 per cent. solution (about 9 grains to a fluid oz. of water) is made by dissolving the trypan blue in boiling water. A sediment falls as the solution cools, and this should be removed by filtering through a funnel, in which a properly folded filter paper is placed, or a fine piece of clean linen which has been previously boiled. The hypodermic syringe and needle, before being used, should be placed in a dish containing cold water, then placed over the fire and the water boiled for some ten minutes. This thoroughly sterilizes the syringe and needle, which is now ready to use when the solution to be injected has cooled.

The injection can be made anywhere under the skin, but the best positions are either in front of the chest or behind the shoulder. The skin in these positions being loose, a fold is easily caught up by the finger of the left hand, whilst the needle is inserted with the right hand. It is advisable to clip off the hair and disinfect the spot chosen before introducing the needle.

A dose for dogs, according to age and size, varies from 1 to 5 drachms or 1 to 5 teaspoonfuls.

The dose for calves and foals, according to age and size, varies from ½ oz. to 2½ oz., or 1 to 5 tablespoonfuls.

# Farm and Garden Notes for November.

Field.—Unless untoward weather or other conditions interfere with field operations during the latter part of October, most of the wheat in the Maranoa will be harvested by the first of this month, and harvesting operations extended to the South-Western Line, and then on to the Downs.

Farmers are commencing to realise that quick maturing wheats which possess a degree of rust resistence are more dependable than the slow-growing and often rust-susceptible kinds, which are gradually giving place to these and mid-season varieties.

Growers are advised to make every preparation to work up the surface of the ground immediately after the removal of their crops, so that the soil may be put into good condition to receive any rain which falls, the conservation of which is the best guarantee for the success of the next succeeding crop. Such initial preparation also encourages the early growth of all foreign and weed seeds, and permits of their eradication by the implements used to produce the desired soil mulch. In such manner paddocks are kept clean and the purity of crops is maintained. The careful preparation of areas intended for maize-planting cannot be too strongly impressed upon growers. Deep and thorough ploughing, followed by cross-ploughing and subsequent cultivation of the soil, must precede sowing if success would be attained; and all efforts must be concentrated to obtain a good surface mulch. Failure to follow up the subsequent sowings by harrowing prior to the appearance of the young plant conduces to weed growths and very often entails, by neglect of this operation, subsequent hand-hoeing between the plants in the drills. Harrowing should be discontinued before the plant breaks through the surface, otherwise damage will accrue to the tender shoots of the young plant. When the young maize plant has hardened up it may, with advantage, be lightly harrowed in the direction of the drills, but such practice must discontinue once the plant has attained a height of 6 inches. Close cultivation by inter-row cultivation implements is necessary after every shower to conserve moisture and to prevent weed growth, care being taken to ensure each cultivation being shallower than the preceding one, and so prevent damage to the root system of the plant, which is extensive. Inter-row cultivation should cease with the advent of the cob on the plant; and, if proper attention has been given to the crop, it should, at this period, be unnecessary. Where crops are planted on the check-row principle, inter-row cultivation is facilitated, and more even crops result.

The French millets (red and white), owing to their rapid maturing qualities, form excellent intermediate or supplementary crops, and are suitable for present sowing. Their value for fodder and seed purposes is worthy of more general recognition at the hands of the average farmer.

Past dry periods have impressed upon us the necessity of providing during good seasons against the return of less favourable ones, and in this connection the cultivation of quick-growing fodder plants appeals to us. Many varieties of useful classes of fodder can be cultivated over a large portion of this State; chief of which, perhaps, are the sorghum family for grain and fodder purposes. Of the latter, Sudan grass has much to commend it, and is fast becoming one of the most favoured by stockowners. Grain sorghums, of which Feterita, Red Kafir, and the various Milos are examples, should occupy a more prominent position for purposes of horse and pig feeding, and are particularly suited to those localities which are unsuitable for maize production. Some varieties of sorghum have strong frost-resisting qualities, and lend themselves to those localities where provision for some form of succulent fodder is necessary during the winter months.

# Orchard Notes for November.

## THE COAST DISTRICTS.

November is somewhat of a slack month for fruit in the coastal districts, as the citrus crop, excepting a few Valencia Late oranges, off-season lemons, and a few limes, is over. Pineapples are also scarce, as the late spring crop is finished, and there are only comparatively few off-season fruits ripening. The main summer crop of fruit in the principal producing districts is only in the flowering stage, though that in the more tropical parts is ready for marketing. It is also a slack month for bananas, as the summer fruit is not yet fully developed, and the bunches that make their appearance are usually poor. They have been slow in developing on account of the comparatively cool weather of winter and early spring, when the suckers were more or less at a standstill. Young suckers should, however, be making vigorous growth now, and the plantation will require constant attention to prevent the stools beings overcrowded with too many suckers. Keep the land well worked and free from weeds of all kinds, as good growth now means good bunches in the autumn and early winter. Where there is a danger of the soil washing badly with heavy rain, rows of mauritius, velvet, or other suitable beans should be planted at right angles to the fall of the land, as the growth they make will tend to hold the soil and thus save any from being washed away. When planting beans of any kind, either to prevent washing or for green manuring, don't forget to manure them, as thereby you will get a much greater yield, and as none of the manure is removed from the soil, as the crop is allowed to lie and rot on the ground, it is all made use of eventually by the permanent crop.

A good all-round manure for a bean crop is a mixture of 1 cwt. of sulphate of potash and 4 cwt. of basic superphosphate or finely-ground phosphatic rock to the acre, and, if the soil is deficient in lime, a dressing of not less than half a ton to the acre will be found very beneficial, as all leguminous plants require lime to yield their maximum return both of haulm and pulse. The pineapple plantations require to be kept in a state of thorough tilth, and no weeds must on any account we allowed to grow. If blady grass makes its appearance it must be stamped out, as once it gets established in the rows it is only a short time before it takes control, and the plantation is ruined, so that it can only be brought back into profit by taking out the pines, killing the blady grass, and, after thoroughly and deeply working the land, manuring it and replanting.

The planting of pineapples and bananas can be continued throughout the month, taking care to see that the land is properly prepared and that the advice given in previous monthly notes is followed. Young pawpaw plants that have been raised in the seed bed can be set out now, as also can young passion fruit. Citrus orchards require to be well looked after; the ground must be kept in a state of thorough tilth, and if the trees show the slightest sign of distress, owing to lack of moisture in the soil, they must be given a thorough irrigation if water is available for this purpose. The trees should be carefully examined from time to time so as to note when young scale insects of any kind are hatching out, and when this is noted they should be sprayed with a weak emulsion of a miscible oil consisting of one part of oil in forty parts of emulsion, as this is quite strong enough to kill any young scales before they develop their protective covering. As stated in these notes previously, no oil sprays should be used when the trees are suffering from lack of moisture, as they are then likely to do more damage than good to citrus trees. If scale insects are very bad, and it is important that the trees are sprayed, a weak lime-sulphur spray, or even a soap and tobacco or weak resin wash, will kill the young scales as they hatch out. In the earlier districts a keen lookout must be kept for the first

appearance of the mites, which are the direct cause of the darkening of the skin of the fruit known as "Maori." The first indication of the trouble is that when the sun is shining on the young fruit, it appears to be covered with a grey dust, and if the fruit is examined with a good lens it will be seen to be covered with large numbers of small yellowish slug-like insects which are living on the skin. Spraying with sodium or potassium sulphide washes, as recommended by the Department, or with a weak solution of lime sulphur, will destroy these insects and prevent the fruit from turning black. Borers of all kinds should be looked for and destroyed wherever found. Water sprouts, if not already removed, should be cut away. Vines will require careful attention, and the vineyard should be kept in a state of thorough cultivation. Spraying for downy mildew and black spot should be continued, if necessary, as well as sulphuring to prevent oidium.

Fruit fly must be systematically fought whenever seen, and special care must be taken to gather and destroy any early-ripening peaches or other fruits that may be infested. If this is done systematically by all growers, as provided by the Diseases in Plants Act, there will be many less flies to attack the later crops of mangoes and other fruits.

Leaf-eating insects of all kinds should be systematically fought wherever seen, by spraying with arsenate of lead, and potatoes and tomatoes should be sprayed with a combined spray consisting of Bordeaux or Burgundy mixture and arsenate of lead, so that diseases such as early blight and Irish blight may be prevented and leaf-eating insects, which frequently cause very heavy losses to these crops, be destroyed.

## THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Keep the orchards and vineyards in a thorough state of cultivation, so as to keep down all weed growth and conserve moisture in the soil. This is important, as, if a long spell of dry weather sets in, the crop of summer fruit will suffer severely from the lack of moisture. Citrus trees should be irrigated where necessary, and the land kept in a state of perfect tilth. Spraying for codlin moth should be continued, and all pip fruit trees must be bandaged the beginning of the month; further, the bandages must be examined at frequent intervals and all larvæ contained in them destroyed. The neglect to spray thoroughly and to attend to the bandages properly is responsible for the increase in this serious pest in the Granite Belt, and growers are warned that they must pay more attention to the destruction of this pest if they wish to grow pip fruits profitably. Fruit fly may make its appearance in the cherry crop; if so, every effort should be made to stamp out the infestation at once, as, unless this is done, and if the fly is allowed to breed unchecked, the later ripening crops of plums, peaches, apples, pears, apricots, and Japanese plums are bound to become more or less badly infested. Combined action must be taken to combat this, the most serious pest of the Granite Belt, and growers must realise that, unless they take this action and see that careless growers do not breed the fly wholesale, they will never keep it in check, and it will always be a very heavy tax on their industry. Rutherglen bug is another serious pest in this district, and is propagated by the million by careless orchardists. The best remedy for this pest is to keep the orchard clean and free from weeds. Brown rot in fruit should be watched for carefully and, on its first appearance in a district, all ripening fruits should be sprayed with the sodium sulphide wash.

All kinds of leaf-eating insects should be kept in check by spraying with arsenate of lead, and all grape vines, potatoes, and tomatoes should be kept sprayed with Bordeaux or Burgundy mixture, the former for black spot and downy mildew, and the latter for early and late (Irish) blight.

# ASTRONOMICAL DATA FOR QUEENSLAND.

Times Computed by D. EGLINTON, F.R.A.S.

## TIMES OF SUNRISE AND SUNSET.

AT BRISBANE.

| 1921. | September. | | October. | | November. | | December. | |
|---|---|---|---|---|---|---|---|---|
| Date. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. | Rises. | Sets. |
| 1 | 5·3 | 5·33 | 5·29 | 5·47 | 4·59 | 6·5 | 4·46 | 6·28 |
| 2 | 6·2 | 5·34 | 6·28 | 5·48 | 4·58 | 6·6 | 4·46 | 6·28 |
| 3 | 6·1 | 5·34 | 5·27 | 5·48 | 4·57 | 6·7 | 4·46 | 6·29 |
| 4 | 6·0 | 5·35 | 5·26 | 5·49 | 4·56 | 6·7 | 4·46 | 6·30 |
| 5 | 5·59 | 5·35 | 5·25 | 5·49 | 4·56 | 6·8 | 4·46 | 6·31 |
| 6 | 5·58 | 5·36 | 5·24 | 5·50 | 4·55 | 6·9 | 4·46 | 6·31 |
| 7 | 5·57 | 5·36 | 5·23 | 5·50 | 4·54 | 6·9 | 4·46 | 6·32 |
| 8 | 5·56 | 5·37 | 5·21 | 5·51 | 4·53 | 6·10 | 4·46 | 6·33 |
| 9 | 5·54 | 5·37 | 5·20 | 5·51 | 4·53 | 6·11 | 4·46 | 6·33 |
| 10 | 5·53 | 5·37 | 5·19 | 5·52 | 4·52 | 6·11 | 4·47 | 6·34 |
| 11 | 5·52 | 5·38 | 5·18 | 5·52 | 4·52 | 6·12 | 4·47 | 6·35 |
| 12 | 5·51 | 5·38 | 5·17 | 5·53 | 4·51 | 6·13 | 4·47 | 6·36 |
| 13 | 5·50 | 5·39 | 5·16 | 5·53 | 4·51 | 6·14 | 4·47 | 6·36 |
| 14 | 5·49 | 5·39 | 5·15 | 5·54 | 4·50 | 6·14 | 4·48 | 6·37 |
| 15 | 5·48 | 5·40 | 5·14 | 5·54 | 4·50 | 6·15 | 4·48 | 6·37 |
| 16 | 5·46 | 5·40 | 5·13 | 5·55 | 4·49 | 6·16 | 4·48 | 6·38 |
| 17 | 5·45 | 5·41 | 5·12 | 5·56 | 4·49 | 6·17 | 4·48 | 6·39 |
| 18 | 5·44 | 5·41 | 5·11 | 5·56 | 4·49 | 6·17 | 4·49 | 6·39 |
| 19 | 5·43 | 5·42 | 5·10 | 5·57 | 4·48 | 6·18 | 4·49 | 6·40 |
| 20 | 5·42 | 5·42 | 5·9 | 5·57 | 4·48 | 6·19 | 4·50 | 6·40 |
| 21 | 5·41 | 5·42 | 5·8 | 5·58 | 4·47 | 6·20 | 4·50 | 6·41 |
| 22 | 5·40 | 5·43 | 5·7 | 5·58 | 4·47 | 6·21 | 4·51 | 6·42 |
| 23 | 5·38 | 5·43 | 5·6 | 5·59 | 4·47 | 6·22 | 4·51 | 6·42 |
| 24 | 5·37 | 5·44 | 5·5 | 6·0 | 4·47 | 6·23 | 4·52 | 6·43 |
| 25 | 5·36 | 5·44 | 5·4 | 6·0 | 4·47 | 6·24 | 4·52 | 6·43 |
| 26 | 5·35 | 5·45 | 5·4 | 6·1 | 4·46 | 6·25 | 4·53 | 6·43 |
| 27 | 5·34 | 5·45 | 5·3 | 6·2 | 4·46 | 6·25 | 4·53 | 6·44 |
| 28 | 5·33 | 5·46 | 5·2 | 6·2 | 4·46 | 6·26 | 4·54 | 6·44 |
| 29 | 5·32 | 5·46 | 5·1 | 6·3 | 4·46 | 6·27 | 4·55 | 6·44 |
| 30 | 5·30 | 5·47 | 5·0 | 6·4 | 4·46 | 6·27 | 4·56 | 6·45 |
| 31 | ... | ... | 4·59 | 6·5 | ... | ... | 4·57 | 6·45 |

## PHASES OF THE MOON, ECLIPSES, &c.

(The times stated are for Queensland New South Wales, and Victoria, where the clock time is identical).

| | | H. M. |
|---|---|---|
| 2 Sept. | New Moon | 1 33 p.m. |
| 9 „ | First Quarter | 1 30 p.m. |
| 17 „ | Full Moon | 5 20 p.m. |
| 25 „ | Last Quarter | 7 18 a.m. |

Apogee on 14th at 6·0 a.m.
Perigee on 29th at 11·48 p.m.

| | | |
|---|---|---|
| 1 Oct. | New Moon | 10 26 p.m. |
| 9 „ | First Quarter | 6 12 a.m. |
| 17 „ | Full Moon | 9 0 a.m. |
| 24 „ | Last Quarter | 2 32 p.m. |
| 31 „ | New Moon | 9 39 a.m. |

Apogee on 11th at 8·54 p.m.
Perigee on 27th at 4·30 p.m.

| | | |
|---|---|---|
| 8 Nov. | First Quarter | 1 54 a.m. |
| 15 „ | Full Moon | 11 39 p.m. |
| 22 „ | Last Quarter | 9 41 p.m. |
| 29 „ | New Moon | 11 26 p.m. |

Apogee on 8th at 6·12 a.m.
Perigee on 21st at 7·54 p.m.

| | | |
|---|---|---|
| 7 Dec. | First Quarter | 11 20 p.m. |
| 15 „ | Full Moon | 12 50 p.m. |
| 22 „ | Last Quarter | 5 54 a.m. |
| 29 „ | New Moon | 3 39 p.m. |

Apogee on 6th at 1·12 p.m.
Perigee on 18th at 7·36 a.m.

A Total Eclipse of the Sun will occur on 1st October, visible in the South Polar Region and up to a few miles south of Cape Horn.

As a partial eclipse it will be visible in the lower part of South America, but not in Africa or Australia.

The Moon will be eclipsed by the Earth almost totally on 17th October, about 9 o'clock in the morning, when it will be below the horizon in Australia.

As Mercury will be at its greatest distance east of the Sun on 8th October, it should be visible in the west soon after sunset for a fortnight or more. On the 3rd it will be to the left of the Moon, and Venus and Mars will be remarkably in juxtaposition before sunrise.

Saturn and Jupiter will pass almost directly behind the Sun on 22nd and 23rd September, and will be seen only before sunrise from about the middle of October to the end of this year.

On and about 14th November Mars and Saturn will appear to be in close proximity, and Mars and Jupiter on and about 27th November.

Venus also will be a morning star till after the end of the year

For places west of Brisbane, but nearly on the same parallel of latitude—27½ degrees S.—add 4 minutes for each degree of longitude. For example, at Toowoomba the sun would rise about 4 minutes later than at Brisbane if it were not for its higher elevation, and at Oontoo (longitude 141 degrees E.) about 48 minutes later.

At St. George, Cunnamulla, and Thargomindah the times of sunrise and sunset will be about 18 m., 30 m., and 38 minutes respectively, later than at Brisbane.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]